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BBC ACORN USER



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Composition on your computer

Studio 24 Plus and Music 3000 reviews

Essential MIDI for micros

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ADFS MANAGER: Discs in order

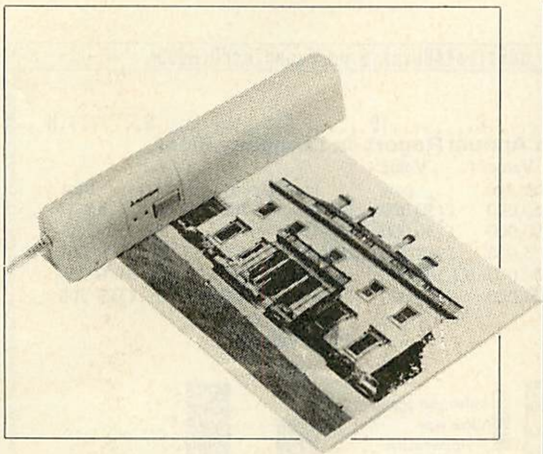
PAGE PERFECT: Acorn's Arc DTP

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FOR THE

ARCHIMEDES

SCAN LIGHT



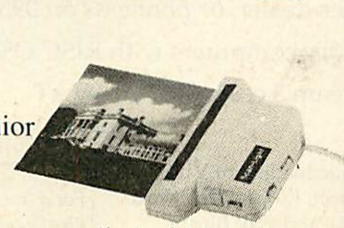
A full A4 width scanner that offers the advantages of traditional flat-bed scanners (for example, it can scan pages from a book) and sheet-feed scanners (its compact size) in one low-cost package.

Supplied with WIMP based software that runs under Arthur or RISCOS, this is the ideal tool for capturing images, pictures and diagrams of all descriptions.

Scanned images may be saved as monochrome sprites or as 16 grey level sprites. The former is suitable for text scans or line drawings etc. Grey-level scans are ideal for photographs.

A4 Scan-Light £449 +VAT (£516.35 inc)

Now also available is Scan-Light Junior, a smaller, lower cost, 105mm width hand-held unit.



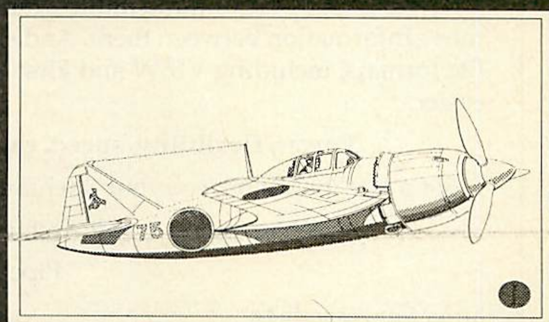
Scan-Light Junior
£189.00 +VAT
(£217.35 inc)

Both scanners are supplied with interface board, on board ROM software, and manual.

PICTURE DISC 1&2

A collection of scanned and quality line art images. One disc contains several grey-scale scanned images (produced on Scan-Light), the other disc includes eight professionally produced, precisely detailed line-art images. The line-art has been produced on the Draw program provided with RISCOS and can be loaded into Draw for subsequent examination or editing. All pictures may be loaded into Paint, Draw or into any program that accepts Sprites or Draw files such as Acorn DTP or Impression.

£13 + VAT for both discs (£14.95 inc)





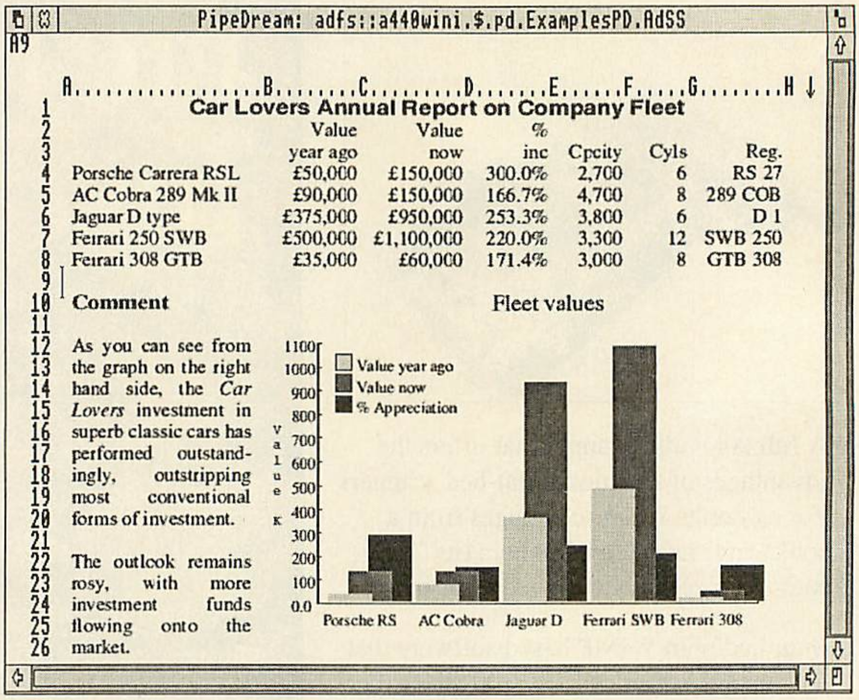
An example of one of the Draw images (above) and a scanned pencil drawing. Both output direct from the Archimedes to a PostScript printer.

Computer Concepts Ltd

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PIPEDREAM 3



PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. You can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

Based on PipeDream 2, the best-selling integrated package for the Archimedes, PipeDream 3 has been completely re-written to take full advantage of RISC OS - if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. And since PipeDream 3 can automatically load and save most popular file formats, including VIEW and First Word Plus, switching to it from other programs has never been easier.

Power, flexibility, speed, ease of use. PipeDream 3. Breaking down the barriers.

For a free brochure, see your Archimedes dealer, or phone us on 0954 211472 or return the coupon.

PipeDream 3 is for all Archimedes computers with RISC OS and 1Mbyte of RAM.

PipeDream 3 costs £147.00 +VAT.

Major features include:

- many documents loaded at once
- intuitive RISC OS user interface
- displaying and printing of pictures within text
- built-in 93,003 word spelling checker
- file compatibility with PC & Z88 PipeDream and BBC View Professional
- background recalculation
- keystroke compatibility with Z88 & PC PipeDream
- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
- automatic saving of VIEW, Lotus, Acorn DTP format, Tab and CSV files
- multi-field sorting
- use of all available fonts
- 62 spreadsheet functions
- external references for 3-D modelling
- macro file recorder
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For a free brochure, complete and return this coupon
PipeDream 3 ☐ View Professional ☐
Name ________________
Address ________________
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____
________________ Post code ________

Colton Software, Broadway House,149-151 St. Neots Road, Hardwick, Cambridge CB3 7QJ, England.
Fax: 0954 211607 Tel: 0954 211472

All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

Colton Software, Broadway House, 149-151 St. Neots Road, Hardwick, Cambridge, CB3 7QJ, England.
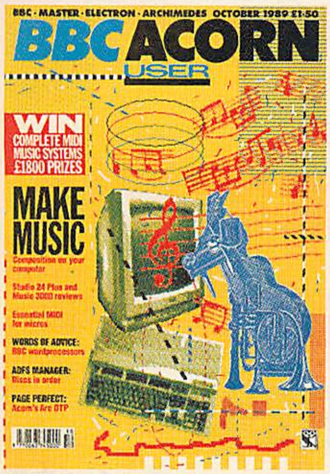
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BBC ACORN USER

ISSUE NO 87 — OCTOBER 1989

WIN A COMPLETE MIDI MUSIC SYSTEM SEE PAGE 88

COVER



COVER FEATURE
Music composition by your BBC micro or Archimedes

Cover illustration by Paul Allen

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NEWS

Educating Arc

The A3000 has been met with an enthusiastic response from many educational software companies.

4Mation Educational Resources is to launch two educational packages this autumn specially written for the Arc.

Craftshop is aimed at inspiring pupils to produce craft work using techniques such as quilling, curving, stretching and embroidery.

4Mations's Neil Souch says further releases to fit into the category of workshop software are being developed.

Jigsaw will 'cut up' a saved screen into pieces and the complexity can be altered to suit ages and abilities. The mouse is used to rotate, enlarge and piece together the jigsaw. 4Mation is on (0271) 45566.

Sherston Software is currently converting its *Typesetter* DTP package for schools to run on the A3000 and Resource has developed a story telling environment for children of eight and over. Acorn has also announced that Dudley local education authority is to actively promote the A3000.

Watford open day

Watford Electronics and *BBC Acorn User* are to hold an open day on Sunday 8th October between 10am and 4pm.

Watford's technical and sales personnel, plus staff and contributors from *BBC Acorn User* and representatives from Acorn will be on hand to answer questions on the whole Acorn range.

Companies showing off their wares include Colton Software, Computer Concepts and Minerva Software and entrance is free.

Ceefax changes spell end for telesoftware

The BBC's telesoftware service on Ceefax has closed to make way for a reorganisation of the whole BBC teletext service.

All telesoftware services including the new satellite weather data facility, educational broadcasts and computer help for the handicapped ceased on August 31.

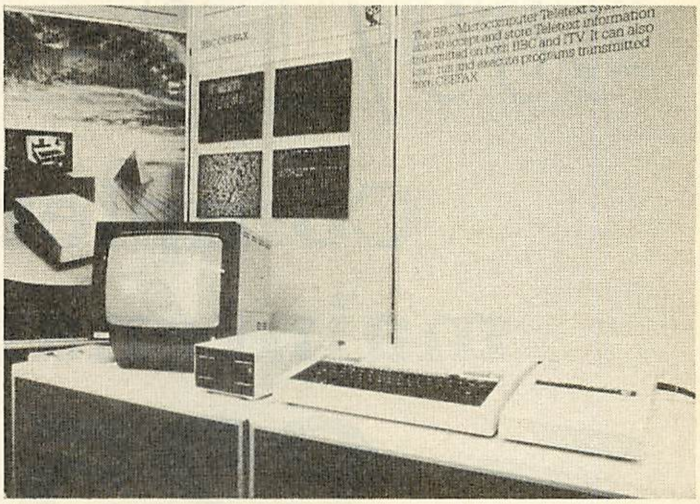
The closure of the telesoftware service follows the closure of Ceefax's computer related news magazine *Next* and the 'forthcoming events' section in previous months.

News of the closure appeared on Ceefax on July 28th, when readers were informed that Ceefax was to be expanded with increased news, sports and share information services. Access to individual pages is also to be made faster.

Least used features such as telesoftware, recipes and other peripheral items would not be part of the new-look service.

Blair Thompson, head of Ceefax informed readers that 'Telesoftware was originally devised to transmit programme notes to schools using BBC schools programmes. The service has outlived its usefulness and the commercial potential it might have had has been overtaken by the highly sucessful Data Broadcasting wing of BBC Enterprises, the commercial arm of the BBC.'

The 'Datacast' data broadcasting service is a more recent addition to teletext and is used to transmit free format data contained in the spare TV lines in an encoded form to subscribers equipped with special receivers.



The closure of IT-related subjects on Ceefax follows the transfer of Ceefax from the Presentation department to the News and Current Affairs department of the BBC. It is intended to turn Ceefax into a more news related service and to increase the subtitling service for the hard of hearing.

John Moulding of the BBC's news and current affairs office told *BAU* that finance played a major part in the decision to close the telesoftware service. Of six million teletext sets in use throughout the country only 31,500 are computer adaptors,' he said 'That's about half of one percent'. However, the telesoftware service uses up a 'total of 10 per cent of the Ceefax budget' said Moulding.

Many adapter owners have expressed concern over the loss of telesoftware to *BAU* and commenting on the closure, Ray Hope, MD of Morley Electronics, manufacturers of the Morley teletext adapter, said 'Unfortunately the closure announcement has coincided with the summer school holidays which has not given educationalists an opportunity to air their views'.

Ramanuj Banerjee of teletext adapter manufacturer, GIS said 'We are disappointed. With the recent addition of improved software and weather map data, we were hoping for an increase in the service'.

But Thompson is adamant the decision is final. The reorganisation and in particular the increased subtitling service 'require resources which cost money,' he said 'my own efforts for finding telesoftware a home have failed'.

The announcement is bound to cause disappointment to existing teletext adapter owners. However, adapters may still of course be used to receive teletext data for display and manipulation on a BBC micro.

Programs for the Archimedes and BBC micro can also be downloaded without charge from Acorn's Support Information Database (SID) and Acorn has plans to expand this service soon.

Parallel Archimedes

Newly formed Cambridge-based Gnome Computers has released three podule cards to add the pioneering Inmos parallel processing Transputer to the Archimedes.

The £200 link adaptor podule connects an Arc to an external transputer. The second podule holds a 'Tram' motherboard of a 10mips T800 Transputer and Ram.

Each motherboard can accommodate up to four Trams with prices starting at £250 for the motherboard alone, to £1300 for a board with a T800 Transputer and 2Mb of Ram.

The overall 'power' of a transputer system is dependent on the number of transputers linked together, so four Trams in parallel on one motherboard will give 40mips or potentially even an amazing 160mips on a four slot Archimedes.

The third podule from Gnome can house either a T425 or T800 transputer with floating-point processing and up to 16Mb of Ram. Prices start at £950 for the T425 version and £1100 for a T800, both with 2Mb of Ram.

Gnome Computing is on (0223) 461520.

Front end for C

Mitre Software has launched its third Risc OS application.

C-Font provides an advanced development environment for users of Acorn's Ansi C compiler. It's made up of an easy to use 'front end' for the compiler allowing users to choose compiler options and compile a file by dragging it to the application.

An enhanced desktop environment is also included as well as a make utility and a number of Risc OS enhancements. *C-Font* costs £19.95. Mitre is on 01-283 4646.

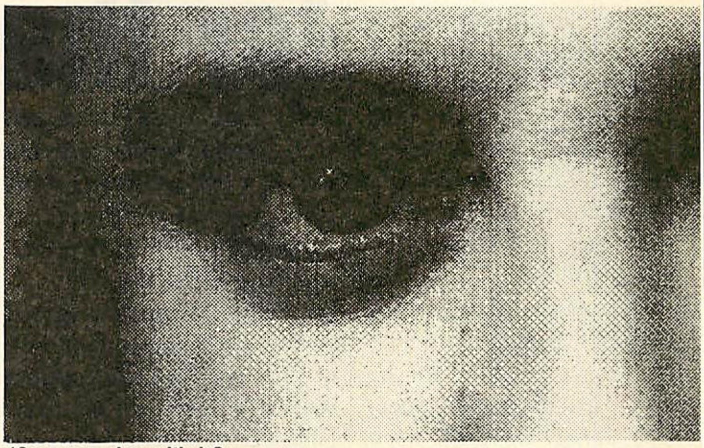
BAU show report

A host of new products to suit both BBC and Arc owners were unveiled exclusively at the *BBC Acorn User* Show.

On sale for the first time on the Wild Vision stand was Chroma 200, a genlock system for the A3000. Chroma 200 comes in three different versions, ranging from the standard home-user version which costs £199, to a version suitable for professional video equipment, priced at £235. On demonstration was Wild Vision's Real Time Colour Digitiser for the Hawk V9 and Chroma 400.

Both are set for a November release but a firm response at the show has encouraged Wild Vision to release 'as soon as possible'.

Clares Micro Supplies launched and sold copies of *Armadeus*, its sound sampler board costing £79.95. Also on show to be released later this month was *Tempest*, a Risc OS compatible DTP package. It will contain a built-in word-processor, text editor and spellchecker, priced £129.95.



16 grey scales with i-Scan

Hand scanners for both the BBC and the Archimedes, priced £155 and £171 respectively, could be found on the Watford Electronics stand. Also available from Watford were Ram upgrades for the Archimedes 305 and 310, priced £310 and £325. Irlam Enterprises was demonstrating i-Scan, a desktop motorised scanner, which offers a resolution of 200 dpi with 16 grey levels.

A range of add-ons for the A3000 were for sale on the Pres stand including monitor plinths, hard disc drives and podule cases.

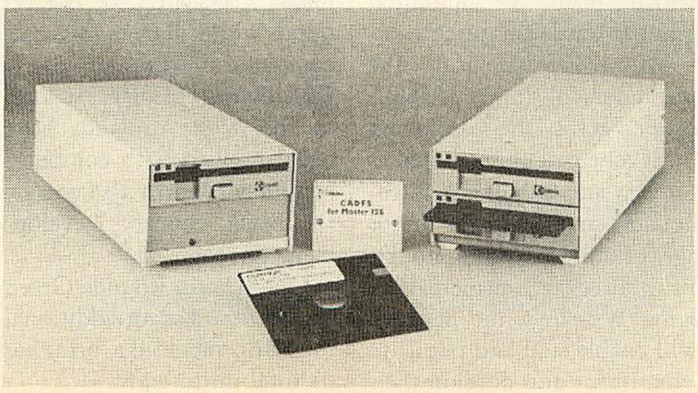
Detachable drives

Cumana has developed a series of removable 5.25in cartridge drives for the BBC Master 128.

10Mb and 20Mb versions in either single or dual units are available with prices starting at £495 for a 10Mb single drive version. Each unit is supplied with a CADFS operating system in a Rom module as well as utility software on a 5.25in 40/80 track ADFS format disc.

The drives feature automatic error detection and correction and operate at up to 60 percent of the speed of a hard disc. Under agreement with Acorn, Cumana has rewritten the ADFS operating system to produce CADFS. Under CADFS *backup has the ability to backup any number of discs of one size onto any number of another.

Cumana is on (0483) 50321.



School successes

Acorn presented over £10,000 worth of computer equipment, including Arcs, to the winning schools in the *Excellence 89* competition, held at the *BBC Acorn User* show.

The competition was run in conjunction with *Teacher* magazine and was based on the originality and success of several hundred projects submitted by schools or classes throughout the country.

No overall winner was singled out, the overall standard was so good. Instead the Norton Secondary school in Cleveland for its project on the natural environment and Blaengwawr comprehensive in Wales for its local history project were chosen as joint winners. Both schools received an A3000 and 420/1 machines.

News in brief

■ Electronic mail service Telecom Gold can now be accessed at any speed up to 2400/2400 baud.

A new London access number, 01-203 3033 can be used for accessing Gold at all speeds. The new number also supports modems with MNP error correction and date compression to level 5.

■ A new exhibition launched by Focus magazines and ITP Publishing is scheduled for the weekend 4th to 5th May 1990.

The Spring Computer Show will be held in Olympia's main hall, and is aimed at the end user in the home and education market. The organisers hope to attract a number of hardware manufacturers including Acorn.

■ Minerva Software has launched a casino game for the A3000. Games within the multi-tasking package include a one armed bandit, blackjack and roulette. Minerva is on (0392) 437756.

Diary Dates

18–19 September. *Educational Networks,* Newman College. Conference on computer networking in education. Tel: LTS (0386) 792617.

27 September–1 October. *Personal Computer Show,* Earls Court, London. Tel: Montbuild, 01-486 1951.

4–6 October. *International Desktop Publishing Show.* London Arena, Limeharbour, London E14. Tel: Database Exhibitions (0625) 879965.

10–13 October. *DES Exhibition,* NEC, Birmingham. Design and Engineering Show covering areas of technology such as electronics and CAD. Tel: Phil Valentine, Reed Exhibition, Richmond, Surrey. Tel: 01-948 9938.

24–26 November. *The Computer Shopper Show,* Alexandra Palace, London. Tel: Database Exhibitions (0625) 878888.

Free maintenance for the A3000

Purchasing a BBC A3000 from Beebug will entitle the user to a free one-year, on site maintenance contract.

Supplied with each A3000 is a registration card. Providing it is filled in and returned to Beebug within one month of purchase date the contract will entitle users within mainland UK to coverage for accidental breakdown.

Cray Technical Services will provide coverage between Monday to Friday during office hours, and will respond to calls within 24 hours. When necessary, temporary replacement equipment will be supplied.

No charge is made for parts or labour, and Beebug is also offering a gold card service which provides coverage for three years at £99 for the base unit and £69 for the monitor. Beebug director, Adrian Calcraft said 'we negotiated with Cray because of our confidence in the A3000 and our belief in offering the best after-sales service.'

Beebug is on (0727) 60263.

Arc's on the isle



A new craft design and technology facility at King William's College on the Isle of Man has been equipped with a network of 15 Archimedes.

The facility was opened by Sir Randolph Quirk, a trustee of the Wolfson Foundation which made a substantial grant towards the project.

The college is using the computers for a range of applications across the GCSE and 'A' level curriculum as well as for City and Guilds and introductory courses for the junior age group. According to Dr Paul Bregazzi, principal of King William's, the network will enable staff and pupils to experiment and develop their skills in wordprocessing, printed circuit board design, picture scanning, digitising and desktop publishing.

'We are very excited about the new opportunities which the Acorn system offers' said Dr Bregazzi, 'it will be invaluable especially to A-level pupils who will be involved in computer aided design.'

■ Eighteen primary schools in the West Midlands have been supplied with computer equipment worth £18,000 by the Black Country Development Corporation.

One school, Rounds Green Junior now has an additional four BBC model B's, bringing its total up to eight.

Second chance

Readers who missed the TV screening of *The Software Show* this April will have another chance to see it this Autumn.

Edited material from the popular BBC programme will be screened in several episodes. Topics covered include databases, desktop publishing, graphics and music and educational software. The transmission dates and times are:

12.55 20 September, BBC2
12.55 25 October, BBC2
11.40 22 October, BBC1
11.40 5 November, BBC1

The BBC's radio series, *Applying the Micro,* will be repeated on Saturdays at 5pm on Radio 4 FM. Programme dates are as follows:

Computers everywhere Oct 14
Computers in Business Oct 21
Micros in Education Oct 28
The Musical Micro Nov 4

Fast warnings

The Federation Against Software Theft (FAST) is developing a number of anti-theft ideas for the leisure market.

These include a warning screen for inclusion in games, an anti-piracy logo for packaging and shop windows plus a video message for use on in-store VCRs that are used to advertise games.

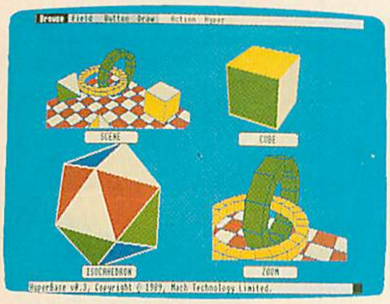
MACH

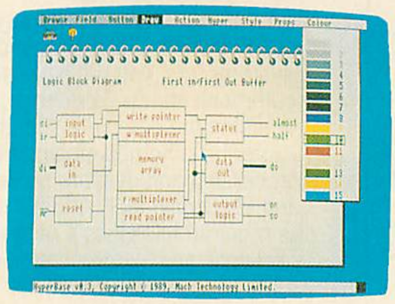
ARCHIMEDES MEMORY UPGRADES

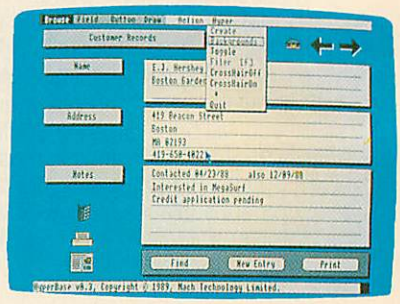
Break the Megabyte barrier with Mach Technology's 2MB and 4MB expansion boards for 300 Series machines.

2Mbyte — £340
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An advanced database architecture supports 'cards' and 'stacks' which can contain textual and graphical information in any combination.

Cards may be connected via user defined links to allow arbitrary information networks to be constructed.

Other features include powerful search and query functions across text fields, sorts and calculations, report generation and printing and the exchange of text and graphic images with other programs.

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MODULA-2

The epitome of structured programming languages now available on the Archimedes.

* Advanced development environment
* Separate compilation
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* System library support for Risc Os, graphics, WIMP
* Extensive documentation
* Language tutorial

£89.95

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A true production quality compiler that supports the full BASIC V language. State-of-the-art parsing, analysis and code generation techniques combine to produce the fastest compiler around.

£39.95

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MACH-286



Open the door to largest software base in the world with our fully IBM compatible co-processor.

The Mach-286 features a full-speed Intel 80286, the MS-DOS operating system, standard graphics support, numeric co-processor facility, the Mach BIOS and more for only £299.

HARD DISC SYSTEMS

Capacity	Access Time	Price
20Mb	65ms	**£249**
20Mb	35ms	**£289**
30Mb	35ms	**£339**
40Mb	28ms	**£379**

Compatible with A305-310, backplane required

Software prices include VAT and delivery in the UK
Hardware prices exclude VAT and carriage

MACH TECHNOLOGY LTD

29 Yarm Lane, Stockton, Cleveland TS18 3DT
Tel: (0642) 613143

Welcome to the A3000

This year's *BAU* show saw few traditional BBC B/Master producers on the exhibition floor.

No BBC Soft, Fernleaf, Logotron, System nor many other educational software houses. On the other hand though, Data Design, HS Software, Nidd Valley and Topologika were all there.

Educationally speaking, the show was otherwise the Archimedes User Show. However, there is much good material being developed for the Arc.

News is filtering through of A3000 developments on the primary front (more of that when it is official) and companies like AVP with its Archimedes *Pixel Perfect* are providing schools with fuel for their machines.

The boundaries are blurring, however, between what is educational and what is a computer tool.

Clares' excellent range of graphics programs are taking schools by storm. Some of the wonderful school entries in the *Render Bender* competition had even the programmers wondering how the animations were done.

Similarly, wordprocessors like *Pipedream* and amazing DTP pyrotechnics from Computer Concepts' *Impression* and the Scan-Light scanner are revolutionising the function of computers in education.

But where have the educational innovators gone? Why do they feel locked out of the Arc market which itself grew from the Beeb market they supported?

I suspect the answer lies in the cost, training and manpower overheads and a lack of certainty about which way the schools market is going to jump in the end.

Let's hope they can catch up before their market folds up.



At last, an icon-driven Z88 with full bibliographic support, in-build comms and now, totally fool-proof. At least, Drage (left) and Evans couldn't even manage to make it giggle.

BUM NOTE

If music be the food of love, prepare for indigestion.

The original MESU music project, set up to investigate the educational potential of computer music has played a sour note.

Little significant has yet been published by this enterprise despite funds of nearly £140,000 being poured in over two years.

One of the few results was *Touching Sounds*, which involved children in creating music through associations with colours, shapes and pictures rather than traditional staves and crotchets.

The idea was good, but had one major flaw. It appears that a substantial part of the code in the program is Hybrid Technology's, used without permission.

A prolonged passage of *Molto Embarrassmento* ensued but NCET is so far unwilling to recall the discs already sent out to test sites or even to acknowledge they have breached copyright.

Watch this space!

WILDLIFE

BBC Soft's *Make a Wildlife Garden* provides young ecologists with the chance to design different habitats in their school grounds.

Its objective is to encourage scientific skills in and out of the classroom and it ties in well with the National Curriculum Attainment Targets 2, 9 and 12. The software is also designed to be used either on its own or in conjunction with the Schools Radio series called *Science Naturally* for the 7–9 year age range.

CONFUSION

ITV is anxious to clear up confusion over the *Key 128* database system.

For those considering purchasing this version of the extremely popular education information pack, the message is that *Key 128* is ADFS only.

If you want to create DFS datafiles then you'd better stick with the older, standard version of *Key*.

Nick Evans

If you've tried to create an A3 Concept Keyboard overlay from an A4 one, you will know they aren't proportional.

Star Microterminals is considering creating one which is proportional but of course it won't work with existing programs or overlay layouts.

■ Having got schools really interested in IT with droves of excellent (well, mostly) advisory teachers, the Government has rightly thrown huge quantities of IT into the National Curriculum melting pot for schools to sort out. No-one will be unaffected.

The implications for schools are immense in terms of both training and equipment provision.

And the advisory teachers? Oh, the government's cutting those back next year.

■ The DES Statistical Bulletin on Information Technology in Schools published in July gives an analysis of trends up to February 1988.

Why this 30 page document took 18 months to produce is a mystery but it shows what most people already guessed – provision in primary schools is way behind the secondaries and fading fast. Acorn then held a substantial proportion of the market (74.4%) and schools' favourite application was wordprocessing. In second place was practice exercises and puzzles – good news for software producers of drill and skill materials!

■ We lost a zero somewhere along the way last month. The long-awaited news on my Educational Datafile and Addresses of interest to Computer Users in Education was out by a factor of 10. This costs £20 and not £2 from me, Nick Evans, PO Box 55, Grimsby, DN32 0QB. Tel: (0472) 77215 or E-mail 83:JNL500.

Making modem music

Although not immediately apparent, comms and computer music have a lot in common. The fact is a bulletin board is one of the most effective methods of distributing computer music.

BBC Basic, Ample data files, sideways Ram music and digitised songs can be downloaded from dozens of BB's scattered throughout the country.

Of course, finding what you want can be time consuming but help is at hand. A group of eight BB operators have formed the Channel-X network which specialises in computer music.

The boards are accessible at either 300/300 or 1200/75 baud in either viewdata or mode 7 format. Most are open 24 hours and have Cet and Xmodem file transfer protocols.

You'll find a wide variety of material ranging from the latest chart releases (together with scrolling lyrics) to old classics such as *The Entertainer!* One board worthy of note is CCL4 which is run by James Lawson.

This is the Channel-X HQ and is first to feature new tracks. James has a number of authors who write original songs as well as adaptations – some of which are excellent.

Even though all telesoftware is free of charge this does not give callers licence to download to their hearts' content. Callers are expected to contribute to the board by leaving messages before downloading a file, and on some systems this is compulsory.

Some numbers to start calling are:

CCL4	(0482) 655798
Odyssey	(0482) 870919
Darkhaven	(0604) 413716
Beyond Belief	(0642) 878898
Eureka	(0603) 250689
Beebtec HQ	(0472) 276476
The Origin	01-661 6433
Phantom Viewdata	(0226) 340425



Greetings comrades! Here in the USSR we are not so far behind you westerners in high technology as you might be thinking. Look, here is my level 3 fax machine with error correction and telephone answering facilities. It operates over a standard three wire system (two for the telephone company and one for the KGB).

For 15 rubles, not only do you get a handy BT user guide but a year's free subscription to our own national user guide – *Pravda!* If only they could do something about the central heating though . . .

BYE-BYE TELEMAP

Telemap Group Ltd which runs Micronet on Prestel has been aquired by BT's Managed Network Services Division which incorporates Dialcom, and which in turn operates Telecom Gold and Prestel.

Previously Telemap shares were owned by EMAP (40 percent), BT (40 percent) and Bell Canada Enterprises (20 percent). It's been on the cards for some time that EMAP has wanted to pull out of viewdata publishing, and Bell Canada Enterprises has not had a roaring success with viewdata systems in the land of Lamot.

That's not to say that BCE is not happy with investing in UK data communications – it's one of the major share holders in the new network that is being operated by Istel.

Micronet is to be integrated with BT's existing on-line services. Will Micronet lose its identity over a period of time as a result of the merger? Telemap is on (0442) 237788.

CHEAP AND CHEERFUL

Spectre Communications has released a low-cost 1200/1200 full-duplex auto-answer modem called the Phantom-3. At £129.95 plus VAT (or £99.95 plus VAT if you trade in your old modem) it's a real bargain.

It can be used as a manual connect or an AT command set modem. Only some of the Hayes AT commands are supported but what you need is there. Do you need 1200/1200 though? If you mostly download, no but if you wish to upload files or do user-to-user file transfers then yes. Spectre is on (09315) 362.

■ Miracom Ltd, formerly Miracle Technology has called in the receivers. The company is best known as maker of the popular WS series of modems.

However, the company diversified into networking where it acquired debts. It's hoped that a buyer will be found for the company.

■ *Comms Plus!* is a magazine aimed at BB operators and users. Subscription only, the mag will feature comms news and coverage of BBs and multi-user games. For more, log-on to the Owl BB on (0532) 605876.

■ Users will be interested to know that Bedfordshire based Esoftc BB has a very healthy download area.

It also has a wide range of on-line conference areas but the Archimedes conference is lacking in content due to lack of interest.

Arc owners who wish to let the world know how wonderful their micro is should call Esoftc BB on (0767) 50511.

■ Run on an Archimedes 440 with hard disc is London based Archive BB. There are loads of downloads and a very healthy message section. The board is used as a contact point for many Arc owners and is well worth a look. Archive is on 01-683 0629.

■ Marvel is a new comms club database on Prestel (*390102). Areas within the mag include hints and tips, news and a features section. Nothing wrong with that but a 50p frame charge for a two page feature and 40p to send in a question, plus 40p to read is expensive to say the least!

■ Prestel has launched its new mailbox facilities (at last). Multi-frame messages with multi-addressing and a summary of incoming messages are some of the features of the new system. A full report on the new mailbox facilities will appear in the next issue.

Name of the game

If you have ever used RENAME on an Ample word and received the 'Duplicate Name' warning, listing the programs (using SHOW) will reveal two words with the same name.

Accesses to the word will now use the definition of the newly renamed word and if you GET it into Notepad that is what you will see.

RENAME also affects the last definition so you can easily rename it back again.

Let's try it. Type in the short example shown in the box, save it and enter:

```
"h" "g" RENAME
```

You'll get the 'Duplicate Name' error but note that the word is renamed anyway. Enter WRITE and you will see that print now contains g instead of h but it still prints 'Hello'.

Load the original program or put things back to normal with:

```
"g" "h" RENAME
```

Try it the other way around:

```
"g" "h" RENAME
```

PRINT still contains h and prints 'Hello' but if you enter h in commands mode it prints 'Goodbye'. Reload or reset with:

```
"h" "g" RENAME
```

Now RENAME g to print and check what happens. Clearly Ample knows what the real definitions of renamed words are. In fact, it will quite happily convert as many words to the same name as you like and you could make all the words in your program the same. Well, almost – it still needs to recognise part words.

You can also brighten your word names by adding colour. In Basic you can create a string containing a colour code such as 129 (SHIFT-F1) for red text, by copying it off the screen. This doesn't work in Ample but by using RENAME, you can sneak colour codes and other normally illegal characters into words.

```
"h"[]     "g"[]    "print"[]
"col"[]    "cls"[]    "ret"[]
"null"[]    "bell"[]    "mt"[]

"h"["Hello" $OUT
]

"g"["Goodbye" $OUT
]

"print"[h
]

"col"["name" 129 $CHR $+ $12
]

"cls"[12 $CHR $12
]

"ret"[13 $CHR $12
]

"null"[0 $CHR $12
]

"bell"[7 $CHR $12
]

"mt"[32 $CHR $12
]
```

You can work with the example program to try renaming all your Ample words in some quite different ways

This is hinted at in the *Ample Nucleus Programmer Guide* (£19 from Hybrid) which tells you that you can create strings containing control codes on the stack. Don't worry, it's not as complicated as it looks.

Take a look at COL. $CHR converts a number into a character string, $+ adds the two strings together – "name" and the 129 code – and $12 swaps the position of two strings. Remember, Ample uses postfix notation. Now enter the clever bit:

```
"h" col RENAME
```

Notice the absence of quotes around COL. Now try SHOW and WRITE and enter:

```
print
```

You can use this facility to create even stranger words. Using cls in place of col above, for example, will name a word as Ascii character 12 to clear the text area.

Try this and enter SHOW to see what happens.

Using RET will name a word as the Return character and pressing RETURN will have the same effect as typing the word. Weird. Use it to rename a RUN word in a piece. null will produce a null string name – "". You can make renamed words using other characters. Try incorporating Ascii 127, the delete characters.

These new words will survive SAVE and LOAD but not a *SPOOL and *EXEC. *EXEC is the same as entering text from the keyboard and you can't create these words that way.

Has this any practical value? Well, I hesitate to suggest one and present it mainly for your amusement. However, as these words are difficult to access, you could use it as a form of copy protection.

Let me throw another idea your way. Redefine some system words like SHOW and WRITE. For example:

```
"SHOW"[]
```

This stops you listing a program but you can retrieve the system words with DELETE. Can you also rename DELETE? What happens if you rename the open brackets word? Try renaming the double quote!

If that's set you thinking and experimenting, here's two final questions. Can you create an uneditable word and is it possible to create an Ample program that can't be broken into?

Ian Waugh

After many requests from users, it seems that Hybrid Technology is planning to release a professional text editor module which can be used alongside or instead of the company's standard Notepad module.

The package will also include several utilities such as the ability to store modules in sideways Ram, an Ample program disc recovery utility and a screen designer.

A program compiler is also included (saving typically 30 percent) to remove spaces, comments, line ends and renamed names. A minimum abbreviation lister and extra commands will be provided too, such as MERGE (at last) and SEARCH (to find unused words).

■ Free with Amplinex II is a Library Manager Utility called *Zrom* from Amplinex member Taj Letocha. The Library Manager Utility loads into sideways Ram (an Eprom is available, too) and allows you to collect together a number of separate files and store them as one large composite file on a DFS disc.

Individual files can be *EXECed into a program. The disc contains a single Library file with around 200 different definitions. These can be *EXECed into Ample in ones or in groups.

■ From issue 12 onwards, Amplinex is publishing a number of Waveform Design utilities which let you construct sound waveforms geometrically by specifying up to 128 points.

This will strike a chord with Music 500 owners but this program will display the waveform graphically – a sort of Wysiwyg waveform kit!

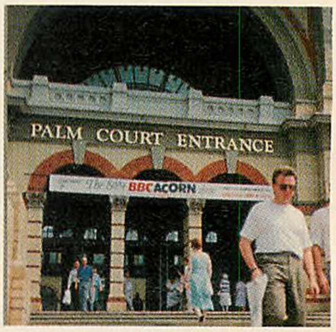
Amplinex, 26 Arbor Lane, Winnersh, Berks, RG11 5JD.
Hybrid Technology Limited, 273 The Science Park, Cambridge, CB4 4WE. Tel: (0223) 420360.

PUTTING ON THE SHOW

Images of the 1989 BBC Acorn User Show from Peter King and Malcolm Brown

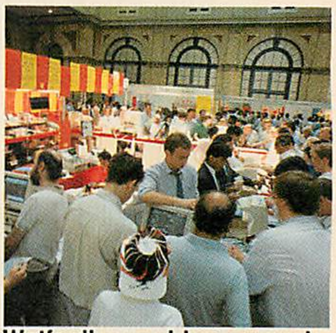








Younger visitors battle it out with Acorn teddies at the games Arcade



Watford's usual large crowds and new scanners, graphics tablet and 4Mb A3000



Computer Concepts showed off the Impression DTP package, Fax Pack and Filer





New scanners were on the Beebug stand and the forthcoming DTP package



Clares kept the crowds amused with Armadeus and Tempest DTP



Spacetech uses the Arc as a satellite weather picture display system

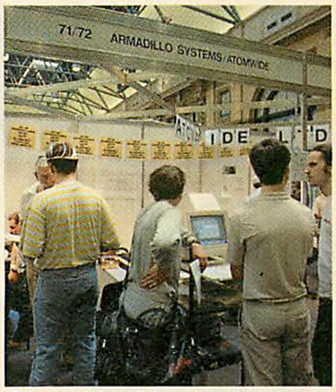


EMR's Mike Beecher struts his stuff for the crowds with the Arpeggio MIDI music system





The Stefanowski family receive the A3000 from Magnus Magnusson, won in our June competition and Brian Lepper, the Arc won in March, from Watford's Nazir Jessa



Atomwide did a roaring trade in and the BAU Apec Arc interfacing board



Dabs Press was there with an assortment of books and the new Instigator and ABC2





Pres was offering add-ons for every Acorn micro from the Electron to the A3000



Dave Acton meters out Archimedes advice and tries to avoid the camera



Minerva demonstrated the Atelier art package and Minerva business software



The BAU glamour girls show off the BBC Acorn User and CAL's T-shirts





Pauline McLernon and Rob Miller share a joke (or something) on the BAU stand while Chris Drage and Nick Evans share everyone's drinks in the Alexandra Palace bar



The Palace maintenance staff obviously had their own thoughts on the Show

QUESTIONS AND ANSWERS

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The Post A Problem service guarantees to give you a personal answer within 10 working days for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

BBC ACORN USER READER SERVICE
20-26 Brunswick Place, London N1 6DJ.

NAME ____________________

ADDRESS ____________________

____

____

POSTCODE ____________________

DAYTIME PHONE NUMBER ____________________

I enclose a cheque/postal order for £4 made out to Redwood Publishing and an sae with my problem.

OFFICE USE ONLY Date in:

Date out:

Answered by:

Q I have written a Basic program that is too long to run in the available memory on my BBC model B with a disc interface fitted. Can you recommend any way I can run it on this machine?

A **Programs run from disc are normally run on the BBC model B with PAGE set to &1900. If your program requires no data files to be read or written to disc using commands like BGET, BPUT, INPUT#, and so on, PAGE may be reduced to gain memory space.**

This could be set as low as &1200. You could also try reducing your program in length by compacting it with a utility Rom like Beebug's *Toolkit* Rom.

It is also possible to load the program from disc and then move it down in memory after it has been loaded. This can be done by certain utility Roms but it is best down by a short routine at the start of the program.

Q I have heard there are some alternative single density disc filing systems available for the BBC micro. Are there any advantages of using one of these?

A **A number of companies have released disc filing systems for the BBC micro. The majority of these filing systems are based on the Acorn DFS.**

They normally offer the same commands plus a few more and claim full compatibility with the Acorn DFS.

The Watford DFS from Watford Electronics is the only one still available. The latest version is 1.43.

The Watford DFS does offer some additional commands and a special 62 file directory as an optional alternative to the Acorn 31 file system.

Q I have heard that with the Master 128, it is possible to achieve much smoother animation effects by using two of the *FX commands. Can you explain some more about this?

A **You can use *FX112 and *FX113 to produce smooth animation effects. The principle is to alternate the banks of display memory so the program can be drawing to one bank while the other is displayed.**

When the drawing is finished, the two banks are flipped over so that the new image is displayed and the old image is erased and replaced by the next image in the sequence.

Q On my BBC micro the screen has suddenly started to 'print' wavy lines across the screen when I am using every mode except mode 7. What could the problem be?

A **The probable cause of your wavyline display is the video ULA (IC6) becoming faulty. Your local dealer should be able to sell (and fit if necessary) a replacement ULA chip.**

Q I use the programming language incorporated in *Worldwise Plus* extensively. I have been having some occasional problems with some of the programs I have written. I have heard that there is a string bug in some of the versions of *Wordwise Plus*. Is this true?

A **All versions of *Wordwise Plus* up to the current version 1.4F do have a string bug. It only occurs when two strings are compared and it is related to the starting address in memory of the second of the two strings.**

Ifel who market *Wordwise*

Plus II have fixed this bug and will exchange your original *Wordwise Plus* chip for version 1.5 for £5.75. For more info, Ifel can be contacted on (0752) 847286.

Q I am currently accessing text based remote databases using my Archimedes and now wish to entend this to graphic materials and access a graphics terminal such as the Tektronics 40XX series. Can you recommend software that I can use for this task?

A **The Beebugsoft *Hearsay* package for the Archimedes provides a Tektronics terminal emulation. This for the 4010 graphics terminal with 4014 conventions. Alpha, graph and point plot modes are supported as well as incremental plot and GIN modes. Sketch and screen dump facilities are also supported.**

Q Can I send a video signal (composite video) from a video cassette recorder to the Microvitec RGB monitor I normally use with my BBC Master 128?

A **Yes, but you will have to purchase an adaptor that converts composite video into RGB. These are normally available from specialist video dealers and cost around £60.**

Q Can the 1Mb ram on an Archimedes 310 be upgraded to 4Mb by replacing the 32 256Kbit chips with 32 1Mbit chips?

A **Unfortunately not. The necessary address decoding and refreshing circuitry is not present on the 310 board. Also there are a different number of pins on the 1Mbit chips.**

However two companies – Watford Electronics and CJE Micros are both producing extra usable memory for the 310 which should be available by the time you read this.

Q At times when I use my Integrex colour printer with my Archimedes I get a line of 'rubbish' in place of graphics data. Is it my printer that is at fault, or is it the software?

A **The problem is with the Archimedes. Your software and printer are not at fault. The strobe signal sent out by the Archimedes is not very 'strong' and sometimes gets lost.**

Integrex printers seem to be particularly sensitive to this. The solution is to buffer the strobe line through an extra chip. Ask your Acorn dealer to carry out a field change order 2002. All new Archimedes have been modified.

Q I am having problems getting Clares' *Artisan* to run properly under Risc OS. I have tried the help provided on the Risc OS support disc but I am still having problems.

A **Some early versions of *Artisan* are causing problems. Send your original disc back to Clares with £3 handling charge and they will update the package.**

Q I have an Archimedes, a Star LC10 colour printer and *Pipedream*. Is it possible to print parts of the text in red and green as well as black?

A **Yes, it is possible but you will have to configure *Pipedream* with a printer driver that includes:**

	On	Off	Text
H1	27 114 1	27 114 0	Red
H2	27 114 6	27 114 0	Green

ACORN CUSTOMER HOTLINE

Acorn's Support Information Database (SID) is now available from a gateway via Prestel. The following software has recently been added to the SID system.

ModeExtend allows you to use multisync modes on a normal monitor.

!FormEd. The Risc OS template editor.

!CharsEd. A keystrokes utility for Risc OS.

Bestcopy. Attempts to recover files from a bad E format disc.

There are also many other useful utilities plus documents covering various areas of Acorn's Computers. Access can also be through PSTN, the number for this is (0223) 243642.

■ For users of the PC Emulator under Risc OS on 1Mb machines we are supplying a new boot sequence which allows you to get approximately 600K for use within the emulator. The boot sequence supplied on the Risc OS support disc only allows you to get about 450K.

The new boot sequence can be obtained via SID or by returning your original disc to Acorn Customer Services.

■ This month we have two application notes which cover hardware ports on the BBC model B and Master 128. The first is a 1MHz bus note (This can also apply to the Archimedes 1MHz bus supplied on the Acorn I/O Expansion Card). The second note is for the serial port, this explains how to change the word format and so on using an assembler.

Please send an A4 SAE when applying for either of these application notes.

■ When using the Mail Merge part of *1st Word Plus* under Risc OS the Window on screen drops down to the bottom of the screen blocking view of the Printer driver select box and the printer output box. We now have a fix for this problem which moves the icon bar which is usually at the bottom of the screen to the top.

The new file is available by returning your original *1st Word Plus* disc back to Acorn Customer Services. The updated file can also be downloaded from SID.

■ There are four printers drivers obtainable from various sources for use with Risc OS. PrinterPS (Postscript printer driver), PrinterDM (Covering dot-matrix printers), PrinterIx (Intergrex 132 Colour printer) and PrinterLJ (Hewlett Packard Laserjet).

Any printer which is compatible with any of the above printers will work fully from the Desktop. Unfortunately it is not possible for Acorn to support every printer available on the market.

We have covered the most popular makes and we would hope third parties will write further printer drivers which have the same look and feel of Acorn's drivers as the need arises.

■ Please remember when returning your discs for upgrading please return the original disc. Please do not put any technical enquiries on the same letter that requests the upgrade.

If you wish to make a technical enquiry at the same time as returning your discs please enclose the enquiry on a separate piece of paper.

Peter Dunn can be contacted at Acorn Customer Support department, Acorn Computer, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN or by leaving a message on the SID database.

LETTERS

BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

ANCESTRAL APPROVAL

Thank you very much for the review of *Family History* in the August issue of *BBC Acorn User*.

I much appreciate the clarity and honesty of style of review which compares with some of your rivals! This goes to prove once again that *BBC Acorn User* is the superior magazine for BBC products.

Colin Chatfield
Micro-aid

Thanks. The cheque is in the post.

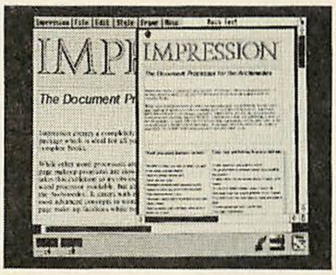
JOLLY GOOD SHOW



I have just returned from this year's *BBC Acorn User* show, which I thoroughly enjoyed although I didn't really buy anything! Like a number of people at the show, my main interests were the new Desktop publishing packages, *Impression* and *Acorn Desktop Publisher*.

As a novice user of *Pagemaker* on an Apple Mac, I was very impressed by both the packages. The output that was on show which had been generated with both packages was very impressive, although it had obviously been printed using Laser or Crystal Jet printers.

I would also like to commend the Computer Concepts and Acorn staff present for



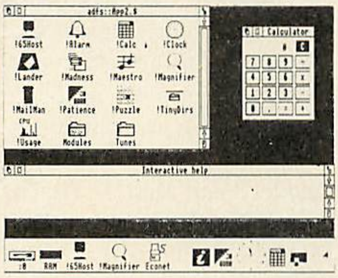
their technical expertise on the two products concerned. Having said that, I would very much like to see *BAU* do an in depth comparative test between the two packages. I think many people like myself are considering buying one of them and would like some independent advice.

Finally, I must congratulate all involved in a very enjoyable show, the Alexandra Palace is certainly a much more pleasant venue.

Michael Sanders
Manor Park

CALCULATED RESPONSE

Just over a year ago I wrote to Acorn to point out that the calculator on the Arthur oper-



ating system did not work properly. I received a reply stating that this was due to the way in which numbers are stored by Arthur.

I am now the proud(?) owner of Risc OS, with, you guessed it, a duff calculator.

As well as this problem, how can I use my diary files created with the diary facility in Arthur 1.2?

Andrew Fletcher
Folkestone

The Arthur desktop calculator does seem to be designed more as a demonstration of the operating system rather than as a practical tool. Not only does it display results incorrectly (because of rounding errors) but achieving results by having to press little buttons via the mouse is fiddly if not impossible.

Fortunately the other software contained on the applications discs is of a high standard and more than makes up for it.

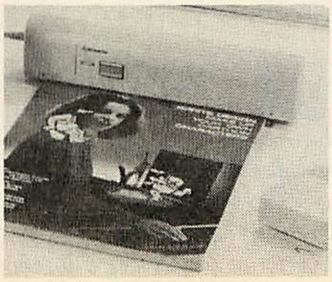
The answer to your second point is to look elsewhere in this magazine for the review of *Timewatch* by Mitre Software. It is a complete Risc OS diary management program and allows the direct importing of old Arthur diary files. Also, we plan to publish a full Risc OS desktop scientific calculator in *BAU* in the near future.

SCANNING THE COST

Having read the letter from Computer Concepts in last month's issue, I couldn't help noticing Mr Moir's comment 'No A4 scanner can be bought for less'. In the same issue, Watford Electronics is advertising a fax machine which includes an A4 scanner for £499.

The quality of the Scanlight scanner is probably better but it is not the cheapest.

J Postlethwaite
Cumbria



ADFS ADVICE

I originally bought my BBC micro seven years ago with the intention of learning computing via the BBC's *The Computer Programme*. Since then, I have slowly upgraded my Beeb for use as a wordprocessor and file manager. My other equipment includes two monitors, two printers and a disc drive.

As soon as the Master 128 was announced I immediately exchanged my Beeb for a new machine and it was then that my troubles started.

Although there are a number of books and articles on advanced ADFS (if that's possible) I cannot find anywhere where the basic concepts are explained for the new user. Could you therefore point me in the right direction or better



still, publish your own article/series on the subject?

Dr Michael Essex-Lopresti
London

Apart from the ADFS Disc Manager in this issue which should make the filing system a little easier, the only book we know of which provides a beginner's introduction to the ADFS is one soon to be published by Dabs Press.

Called *ADFS – A Dabhand Mini Guide*, Dabs says the guide is suitable for beginners and experienced ADFS users and it is expected to be available in November for £9.95.

AFTER THE RAVE REVIEWS OF ARTISAN...

"A sophisticated graphics package... Artisan is a true load and go program... A real first for Artisan is its 'magic brush'. Its effects have to be seen to be believed... It's friendly and foolproof... Artisan operates at a lightning fast speed... It's streets ahead"

Acorn User - February 1988

"deserving of special mention is a facility called Magic Brush... a true cut and paste... 'Artisan' wins hands down.

Archive - February 1988

"Artisan is a highly superior product... very classy... the manual clearly explained all the many features... go and buy this package now."

RISC User - November 1987

"Artisan represents excellent value for money... superbly designed pop up menus... very friendly, foolproof and quick to use... incredibly easy to use. Instantly appealing... superb features... the Magic Pen is unique to Artisan. Quantel would have been justified in getting a little upset... well organised.

A&B - December 1987 & January 1988

"Artisan makes the Archimedes superb... a truly professional product. The possibilities are endless. I can certainly recommend Artisan."

Micro User - January 1988

"With its versatility, Artisan stuns... It is superb..."

Times Ed - 5/2/1988

WHAT WILL THE CRITICS MAKE OF THE SEQUEL!

After every successful original you'll find a sequel.

Artisan is no exception, and while we admit it's software not celluloid, its reviews are no less impressive. Acorn User said it had to be seen to be believed. RISC User enthused—It's a highly superior product. And Archive said, Artisan wins hands down.

We fully expect Artisan II to be equally as well received.

Hardly surprising though, it has all the features of the original with a lot more besides. It runs in Mode 12 and makes use of the Windows, Icons and the Mouse as well as using standard files for all input and output. Allowing standard screens and sprites to be interchangeable. And harnesses the power of Archimedes, providing a program that's easy to use. In fact, it's been hailed as the best of its kind. Artisan original included features like Magic Brush, Pixel mixing, User definable palette, improved image distortion.

And now we've packed Artisan II with lots of new additions like grid lock, Air Brush, Sprite viewer window, full RICS OS compatability, Graduated Fills and special Textile Design features such as Full and Half Drop Sprites with variable repeat functions.

Artisan II. It's the sequel enthusiasts have been waiting for.

From Spielberg? No, from Clares.

£59.95



If you are a registered user, return your original Artisan disc quoting your Registration number and send us a cheque for £30. We will send you the new version by return of post.

CLARES
MICRO SUPPLIES

98 Middlewich Road, Rudheath, Northwich, CHESHIRE CW9 7DA.
Telephone: 0606 48511 Fax No: 0606 48512

PRES

In the forefront with A3000 upgrades

Advanced Computer Products

TEL: 0276 72046 FAX: 0276 51427

range of software products available through PRES

A3000

A3K1 . . . a free standing monitor plinth that allows the A3000 to move back and forth beneath the monitor, helps prevent accidental contact with reset key and is upgradable to . . .
A3K2 . . . provides the scope for up to two further floppy drives (3.5/5.25) AND a hard disc drive housed with style above the A3000 — no boxes hanging on the end of ribbon cables.
ALSO A3K3 . . . a specially designed case to house Podule/expansion cards. This case locates and is bolted to the back of the A3000 to ensure a safe and sturdy expansion. The bonus is that it will be expandable to take up to a further 4 smaller podules. Current development includes . . . ADC/DAC, SCS1, battery-backed RAM, midi, etc.
Also a user port, 1 mHz bus, also disc drive expansion board, with more planned.

ADVANCED CONTROL PANEL (20)/M/B/E/C £34.50

ACP is a front end control panel language providing a sophisticated yet friendly interface between user and computer for access to Languages, MOD functions and the users own file utility etc. Main features include pull down windows, simple to change MOS configure, floating point calculator, file manager, SW ROM's facilities.
(16K EPROM & FULL MANUAL)

"It's very easy to create an entire customised front end for your own use." – *Acorn User, August 1987.*
"ACP is much better than any of the other front end systems I've seen." – *Acorn User, August 1987.*
"I can recommend it to anyone who wants easy access to the Electron's functions." – *Electron User, August 1987.*

ACPs main features are:
★ Pull down windows operate throughout
★ Users can create their own windows

ADVANCED ELECTRON DFS (05)/E £24.15

Electron & Plus 3 users . . . gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. We can also supply 5.25" disc drives to add to your Plus 3 (inc 2nd drive adapter). "ACP has produced another superb ROM for the Electron". . . Electron User Feb '86 (Supplied on 16K EPROM + DFS MANUAL)

Also DFS E00. An alternative to the DFS, designed for use in Sideways RAM (ABR). **(14)/E + ABR** (3.5" ADFS disc + manual) ***£19.99***

ADVANCED BATTERY-BACKED RAM M/E

A standard Acorn approved cartridge but containing 32k (2 x 16k) of sideways RAM. The added bonus is the battery backed feature that holds the RAM contents when the power is switched off! Different ROM images can be loaded into either bank from ROM images previously saved. The banks can also be locked to imitate ROM use. Now it is possible to have View & ViewSheet in one cartridge every time you switch on. Other uses include &EOO ADFS, printer buffer, ROM software development. The use of ABR is simplified by the newly written PRES software utilities which include:- SaveROM, LoadROM, Lock, Unlock, Printer Buffer, Zero and MakeROM a new utility to put your own software from disc or tape into ABR and use the ROM filing system. All software is supplied in ABR with a simple menu to transfer the utilities to your own media. No hardware switching - totally software controlled. Instructions for using supplied software and necessary information for users developing their own applications.
"It's a superb add-on and a must for all serious Electron Users". . .
Electron User **£39.00 excl VAT; £44.85 incl VAT**

ADVANCED PLUS 7/M/E/B/C £39.50 ex VAT; £45.42 inc VAT

An internal battery-backed RAM upgrade for the Advanced Plus 6. TWO 16K pages of Sideways RAM, battery-backed and featuring full write protect facility. Just like ABR but fitted internally & vacating a cartridge slot. This product is compatible with all Acorn BBC/Master & Electron computers.

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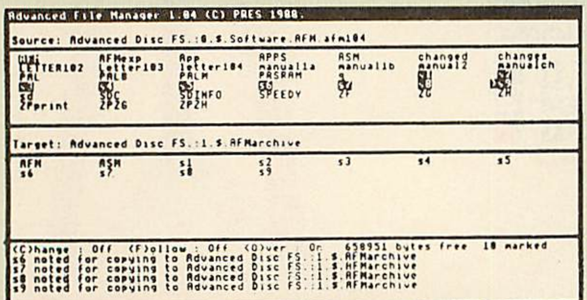
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July '88

FILING SYSTEMS

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ARC AGORA

DIGITISING SPEECH

Speech sampling can cost memory. Save space with our sound compression module for the Archimedes

David Acton

The trouble with digitised speech, or any digitised sounds for that matter, is size. One second of high-quality sound sample takes up 41K or so. A few more seconds and you've used up all the available memory.

This month I offer something of a solution. It's a sound compression module, taking sound sample files and crunching them down to a more convenient size.

The samples I've been using were produced using Armadillo's 8-bit sampler board. It shouldn't be too difficult to adapt the program to work with other samplers.

The module "BAU-SOUND" is assembled by listing 2 on the yellow pages, but you'll need to run listing 1 first as this creates essential tables. When you've done so, load the module with *RMLOAD BAU-SOUND and three new commands are at your disposal.

```
*CompactSample <file1> <file2> <rate>
```

This command takes a sound sample file (named "file1") and attempts to compact it. The crunched file will be called "file2" and you may specify the rate at which the sample was made. 1 is the top sample rate (of around 41 KHz), 2 is half this (20 KHz), 3 is a third and so on. This value is saved at the start of the crunched file for the other two commands to use.

```
*FilePLayBack <file>
```

This plays back a crunched sample file. The file is not actually loaded – instead, four buffers are used. This means that you can play back a long sample using very little memory. The limitations on the use of this call depend on where your file is stored, how high the sample rate is and how successful the compaction process has been.

If the machine can't get the data in fast enough it will repeat short sections – in this case, you'll need to use the command below. Hard-disc and Ram-disc users should have no problems, and you'll be able to play back most speech stored on floppies if the sample rate isn't too high.



Even the Arc can run out of memory

```
*MemoryPlayBack <start> <length>
```

This plays back a crunched sample file that has been loaded into memory. The parameters may be in decimal or (more usefully) hex, but in this case remember to precede these with '&' – for simplicity, the call "OS_EVALUATEEXPRESSION" has been used to decode the parameters and this requires the '&'.

To understand how samples may be compacted, remember what a sample consists of. Essentially, a sample is a string of numbers that reflect the position of the loudspeaker (or state of the microphone) at any one instant. They represent fluctuations around some central point. In the case of Armadillo sample files, this movement is situated around a centre value of &80.

Fortunately, the individual changes from one number to the next tend to be quite small and we use this fact to enable the sounds to be compacted. This isn't so much luck as nature really, since all sounds are produced by something vibrating and the laws of nature dictate that such vibrations are never too violent.

The sample is broken down into groups – each 16 bytes long. Each byte is compared with the next and the largest and smallest differences within the group are noted. The smallest is then subtracted from the largest to find the range of changes, and the number of bits needed to store this range is calculated.

Typically this might be 3 or 4, although it could be 0 during silent patches. This number of bits and the smallest difference are written to the compacted file followed by the data for each of the 16 bytes.

Each byte is compacted by writing it as the difference from the last byte minus the smallest difference for the group.

Thus, only 'n' bits are needed for each byte where 'n' is the number of bits needed to store the range of differences for the group. Typically, speech and simple sounds can be reduced in size to a third or so. Also, the higher the sample rate, the smaller the individual fluctuations and hence the greater the reduction in size.

Further reduction in size is possible because while any value from 0 to 255 may be sent to the Archimedes loudspeaker, in practice only 125 different values are actually sent. This is because sample files must be transformed logarithmically before being played back. The tables produced by listing 1 and imported by listing 2 enable this transformation and the extra compression it affords.

The module header should be familiar by now, and the code to sort our parameters is also fairly standard stuff. The compaction is performed by

.COMPACTSAMPLE which uses multiwrite to write data bits-at-a-time. Sound playback is performed by .FILEPLAYBACK and .MEMORYPLAYBACK which both call .MAINPLAYBACK. Incidentally, bits of the register flags are used to note the source of data (file or memory) and whether the end has been reached.

NUMBUF% is the number of playback buffers used. This is 4 at the moment and the system works like this. Buffers 0 to 3 are filled with expanded sound data by calling .REFILL. Then, playback is started. The location reading contains the number of the buffer being played. As soon as this changes from 0 to 1, buffer 0 is refilled.

The process continues, the refilling part always trying to keep ahead of the playing part. Remember that the playing part happens in the background under interrupts whereas the refilling is the foreground task. Playback goes on until (through a series of flags) the end is detected or Escape is pressed.

The sound is generated using the voice "BAU-SOUND". This is installed and then later removed using SWI "SOUND_INSTALLVOICE" and SWI "SOUND_REMOVEVOICE" respectively. The call "SOUND_CONFIGURE" is employed to set the playback speed to the correct rate. "SOUND_QINIT" resets the sound scheduler and a note is played using "SOUNDQSCHEDULE" after attaching voice 1 to "BAUSOUND" using "SOUND_ATTACHNAMEDVOICE".

£10 PRIME NOTE

Well! I thought we might get one or two replies to the prime number challenge in the August issue, but I didn't expect the considerable response we got. Many thanks to all of you who wrote in. I'm sorting through the submissions at the moment and will be publishing the best next month – not just the fastest solutions, but the most elegant as well. (This isn't just any old column ...)

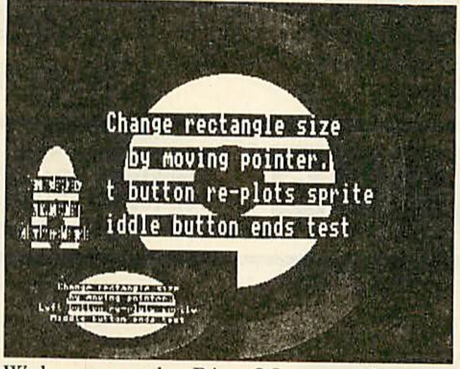
£10 LOCAL CALL

Here's a Basic tip from an Agora regular (try saying that after 101 pints of Guinness). Terry Blunt provides a useful method of claiming local variable space and his program (which earns him £10) appears as listing 3 on the yellow pages. The function FNOS_VAR needs workspace for the call "OS_READVARVAL" and so uses the free space beyond where the program, variables are stored. The command DIM A% , sets a% to the start of this space.

You should be very vareful not to declare any new variables in a procedure after the DIM as this will of course trample on your workspace.

Incedentally, the technique which is used will work on Beebs and Masters too, but Arc users can replace the DIM with A%=END. This is a new feature of Basic V and END points to the first byte of free memory.

£5 SCALE MODEL



Welcome to the Risc OS spot. This is a quick introduction to the new sprite operations. A demonstration program is included as listing 4 on the yellow pages.

So that applications may work in any mode (as indeed all applications should) the "OS_SPRITEOP" calls have been extended to allow sprites to be scaled up and down in size and their colours converted appropriately. Under Arthur 1.20, an application would print text or display directly on the screen and thus would have to adjust the way it did so depending on the currently selected mode.

With Risc OS though, you can create a sprite in the mode of your choice (mode 12 being a pretty good choice for most applications) and write to it rather than to the screen. Then, the sprite can be plotted on the screen using a single SYS "OS_SPRITEOP" which will take care of all the colour and size changing necessary.

Listing 4 demonstrates the point. First, a sprite is created by drawing a picture on the screen and grabbing it. The sprite area SP% is initialised at the start and the grabbing is done using "OS_SPRITEOP",256+16. The '16' means 'get a sprite' and the 256 is added in because you are using your own sprite area and not the operating system's one.

The plotting of the scaled sprite is done with:

```
SYS "OS_SpriteOp",256
+52,sp%,"test",0,0,0,sca
le%,-1
```

SYS "OS_SPRITEOP",256+52,SP%,"TEST",0,0,0,SCALES%,-1

where the parameters are as follows:

0: '256+52' meaning 'PutSpriteScaled'
1: sprite area base
2: sprite name or address
3,4: screen co-ordinates
5: gcol action
6: pointer to scale factor table (or <=0 if not used)
7: pointer to colour translation table (or <=0 if not used)

The scale factor table contains four words: x-mag, y-mag, x-div and y-div. The 'mags' are divided by the 'divs' and this gives the scaling factor in a particular direction. There are many more new sprite calls, and no doubt we'll being taking a look at them in future Agoras.

MAIL BOX

Now a useful tip for users of First Mail. It comes from R W Burrows of Highbridge in Somerset. He informs us that with Risc OS, you can't see the printer control panel because it is covered up by the main work area window. Mr Burrows has got around the problems by altering the template file "IML_TEMPLA".

First, make a copy of the template file just in case! Then, load it at a suitable free location (SAY &9000) with *LOAD IML_TEMPLA 9000. Then type:

```
!&9AA8=155
!&9AB0=1023
```

and save the amended file with *SAVE IML_TEMPLA 9000 +AEA. The window "T_DESK" should now be a more useful size and in a more convenient place.

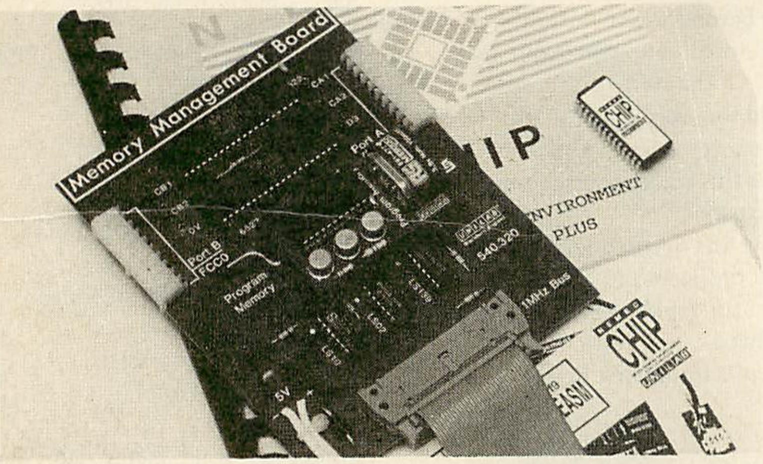
£10 will wing its way to Mr Burrows for that one, and if you have got round a similar problem, why not write in and share your wisdom?

Programs, ideas, hints and tips are always welcome – please send them to: Arc Agora, Acorn User, Redwood Publishing, 20–26 Brunswick Place, London N1 6DJ. Impress your friends, be a hit at parties and earn up to £20 at the same time.

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HINTS & TIPS

MINI MENU

A menu to fit on less than a page, smooth scrolling and miniature screens

David Atherton

Menu programs, which give at a glance a list of the files available and allow you to load a selected file at the touch of a key are not exactly rare but this £10 program from Carl Bateman has a couple of distinct advantages.

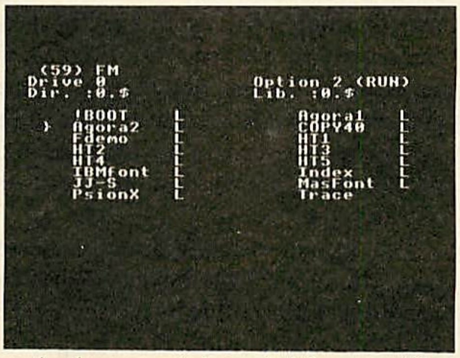
Firstly, although there are quite a few menu programs around, most of them are written in Basic, making them language specific and so of little use with word-processors, spreadsheets, other languages and the like. Secondly, this menu occupies (just!) less than one page (256 bytes) of memory, meaning that it can be loaded into page &9 of memory and it does not corrupt anything else.

The menu provides a utility that can be used with virtually any language. it has been tested with a number of Roms, and so far it works with *View*, *ViewSpell*, *ViewSheet*, Comal, Basic, Logotron Logo, ISO-Pascal and *Starword*. Unfortunately, *ViewStore* has been the source of a few difficulties due to the way in which it accesses several different files from different directories.

The program is simplicity itself to use. Once typed in and run, the source listing assembles and saves a machine code program called M. The menu can then be run by typing *M. The disc is catalogued, and a cursor displayed, this is controlled with the Z, X, : and / keys (the usual cursor keys for games).

Pressing L will load the file being pointed at, while 0, or 2 will give a menu of that drive, allowing both sides of the same disc, or the same side of successive discs to be 'menued'. Pressing ESCAPE exits the program without loading a file.

To maximise its compatibility and usefulness Carl wanted the program to be fully legal using only recognised OS calls, to be compact and not overwrite any work space being used by the current application, such as user defined characters, function keys and the like.



As the menu is intended for use with a disc system this made the cassette buffer at page &900 favourite, since it is unlikely to be used.

However, this left only 255 bytes to play with. This has meant that as the program was developed it had to be constantly pared down to keep the code to a bare minimum. This unfortunately has resulted in some of the programming being rather spartan.

Carl had hoped to include options to CHAIN, READ, *EXEC, *LOAD, and *RUN files but it quickly became obvious that there simply wasn't enough room.

ADFS compatibility was also planned but again space restrictions and the lack of ADFS made this impossible. As it stands he feels that the program fulfills its original aims, but leaves plenty of scope for improvement.

The program works by first clearing the screen, then cataloguing the current disc. A '}' is used as the cursor and is initially placed so that it points to the first filename of the catalogue. OSRDCH is used to read the key being pressed, with a check for an error condition (caused by pressing the ESCAPE key) and program termination if one occurs. The input characters are forced into lower case, so ignoring the state of the SHIFT and SHIFT LOCK keys.

When a keypress is detected, its value is compared against a table to see it it should be acted upon. If it should, the appropriate routine address is found from the same table. To save space only the low byte of the routine address is stored in the table, this is possible since all the program code is held in the same page.

As the cursor is moved, its current position is stored and compared against maximum and minimum values to keep it within the bounds of the catalogue. Unfortunately, there isn't sufficient room to keep track of the actual size of the catalogue so the maximum possible size is always assumed.

All the filenames are shown on the screen so there is no need to store them in Ram, again saving space. Once a filename has been selected the string LOAD " is first placed into the keyboard buffer using OSBYTE 138. Its name is then read from the screen a character at a time using OSBYTE 135 and placed into the buffer. When a space is found it is taken to mark the end of the filename and the final apostrophe and carriage return are placed into the buffer before exiting.

Control passes back to the current language which will now find the string LOAD "FILENAME" in the keyboard buffer, which it should then act upon.

The biggest problem arose from the fact that language Roms have different syntax for input commands. Even within the *View* family different abbreviations and delimiters are used.

Since some languages will accept LO. as a valid short form but others will assume that the full stop is part of the filename, the LOAD command cannot be abbreviated unless the utility is to be used with only a few specific languages.

Presuming that Basic will be one of the most commonly used languages, the filename will have to be enclosed by apostrophes. However, certain languages will take the first non-alphanumeric character after the LOAD to be the delimiter between the command and the

filename – they take the commands

LOAD file and
LOAD"file

to be identical. Therefore the string LOAD"FILE" would cause an error. So finally, the form of the string to be read into the buffer to ensure the greatest chance of working is:

LOAD"file"

and this is what is used.

All in all, simple and straightforward, and short enough to put a copy on every disc you work with. Simply enter the language of your choice and type *M, then select a file from the list. Note the program will not work correctly if you press the cursor keys. You can change the prompt character and the message by altering the text strings at the end of the program. The LOAD keyword is stored backwards, any alternative keyword or sequence you insert. For example, to load a *Wordwise* file, the sequence would be 2 <filename>. You can insert carriage returns in the sequence too.

£5

SMOOTH SCROLLING CHARACTERS



Murray Mackenzie of Edinburgh has sent a program which uses an interesting method to display characters. Each character is 'dropped' into position using smooth single pixel scrolling. The first demonstration program (in the yellow pages) drops the text into place, using the procedure PROCSCROLL, which takes three parameters, the text to be displayed and the horizontal and vertical text positions on the page.

The second demonstration program takes the idea a little further, replacing one string with another by replacing each of the characters in the first string with the corresponding character in the second of the two strings.

The program works by taking each character of the string and redefining it eight times. The first definition places the bottom row of dots in the character on the top row of the character and then prints it on the screen.

All remaining rows are set to zero (ie blank). Then the character is redefined again with the second to bottom row on the top row and the bottom row on the second row, and again all the other rows are blank.

The character is again printed on top of the previous one. Then the bottom three rows are displayed, and so on, until all eight rows have been done.

The final definition is identical to the original character. The program does not actually redefine the character code in question. Instead, all redefinition and printing is done using character 224, a user-definable character available in all BBC configurations. The character patterns are read using the standard system call OSWORD &10.

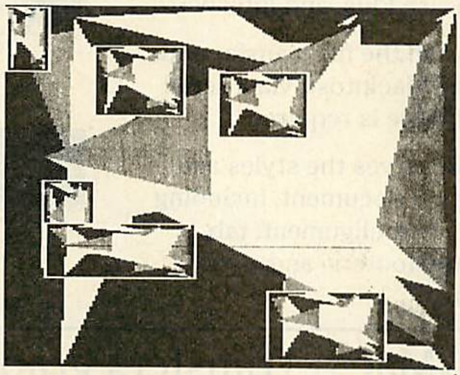
The second program uses two strings, replacing one with another. If one of the strings is longer than the other, then the

effect occurs throughout the longer string. The method used is similar but this time, the rows 'underneath' the new rows being built up are not blank. Each character from the new string is used in turn to build up the top rows of the redefined character but the bottom rows consist of data from the old character, starting from the top.

So, the first iteration displays the bottom row of the new character in row 1 and the top seven from the old character in rows 2-8. The next iteration fills rows 1-2 with rows 7 and 8 of the new character, and rows 3-8 with rows 1-6 of the old character. The routine continues like this, giving the new character being scrolled in and the old one out.

The program should work on everything from an Electron (the machine Murray used for development) to an Arc. Note that with the Arch, the effect is lost due to the speed of the machine, and a delay command should be inserted such as DUMMY=INKEY(3) immediately before the NEXT LINE instruction (or anywhere in the inner loop).

£5 SCREENS IN MINIATURE



Mr A Bennett of Portsmouth has sent in an interesting program which copies an entire graphics screen into a screen window, defined as the current graphics window. The program correctly scales the original graphics screen into the dimensions of the window, including any additional non-linear stretching required to make it fit.

A machine code file called LPIC will be saved to disc. The next stage is to save the graphics screen of your choice to disk. The standard technique for this, discussed many times in the past in these pages, is to append to your program which creates the desired screen the following line:

```
*SAVE <screenname> <start address> 8000
```

where <screenname> is the filename you wish to give to the screen, and <start address> is 3000 for modes 0, 1 and 2, and 5800 for modes 4 and 5, so *SAVE PICTURE 3000 8000 is the command which will save a mode 1 screen under the name 'Picture'.

To reload the screen into a graphics window, first define the window, using the usual VDU 24 command, and then issue the command *LPIC <SCREEN NAME>, in this instance *LPIC PICTURE. The original screen will be reloaded into the window.

You could use the utility to incorporate full screen designs into a larger information page, perhaps as the basis for a graphic menu system or a catalogue of screens available on a disc.

For speed, the program works at a byte

level, reading in the pixel data as saved and dividing the full width and height into the reduced area provided by the window. The resultant pixels are displayed by direct screen access.

For this reason, the program will not work in shadow mode and the new screen containing the graphics window must not be scrolled.

The program uses the 640 times multiplication table pointed to by &E0 &E1 and so will not work on a Master Series machine, as these do not use this pointer.

£5

NEVER SAY NEW AGAIN

Derek Dingle of Birmingham uses *Wordwise Plus* to write for a living and has come up with an elegant way to delete one segment rather than the whole memory. :NEW in *Wordwise Plus* has really destructive power, wiping text in all the segments as well as the main text area. The tactical answer to retaining valued segment text whilst knocking out all unwanted material in the main area is a selective and safeguarded segment program.

Use *Wordwise Plus* to write this file, called, originally enough, DELETER, and save it onto your boot disc:

```
DOTHIS
PRINT" "
PRINT" "
PRINT" Are you sure you wish to delete text?"
PRINT" "
PRINT" Press DELETE to confirm,"
UNTIL GET=127
SELECT TEXT
DELETE TEXT
RECOUNT
END
```

Without a TAB command in the *Wordwise Plus* language, the PRINT" " lines are needed to position the text on the menu screen. Similarly, the spaces in the text place the instructions correctly on screen.

127 is the keyboard code for the DELETE key. Pressing ESCAPE puts you back into the segment, cursor control keys have no effect, and any other key simply repeats the 'Are you sure you wish to delete text?' query. RECOUNT resets the word counter to zero, after the text has been deleted.

You should add the following lines to the end of your !BOOT file (after the *WORDWISE command):

```
:CLS
:SELECT SEGMENT 7
:LOAD TEXT "DELETER"
:SELECT TEXT
:DISPLAY
```

Segment 7 is used because function key 7 already has the 'Delete Marked Text' function, which may cause confusion.

So, when you've had enough of your main text, press SHIFT-F7, press DELETE or BREAK as appropriate and off you go again.If you want to delete the text in a particular segment, simply select that segment from the *Wordwise* front menu and press SHIFT-F7.

£5

ADFS WIPE

Another offering from Murray Mackenzie is a machine code version of *WIPE for ADFS users. Murray saw my Basic version in the December 1988 edition of *Hints and Tips*, and while agreeing that it is a useful utility for ADFS users, decided that a more convenient version, which can be used from any language would be one written in machine code, which can be kept in an ADFS library.

The listing in the yellow pages provides such a program. If you run it, a machine code file called WIPE will be created and saved to disc. This should be placed in a library directory on any ADFS disc from which you wish to use the command.

To run the program, MOUNT the drive, and select the directory you wish to wipe some files from, and type *WIPE. The normal list of files is presented, one at a time, with a Y/N prompt. You should press the Y key if you wish to wipe the file, N otherwise, just like the DFS version.

Provided the file is not locked, it will be deleted.

The program works by issuing the OSGBPB 8 call which reads the filenames in a directory. Each filename is read in turn and printed, followed by the Y/N prompt. No attempt has been made to separate files and directories but if a directory is encountered, and it is empty and not locked, it can be deleted just like a file.

The way the filenames are handled is rather neat. Each name is placed in an eleven character buffer, where it is preceded by a space. Immediately prior to the text is the text of the word 'DELETE', and immediately afterwards is the text (Y/N):. This allows one routine to print '<filename> (Y/N):', and another to use OSCLI to execute DELETE <FILENAME>.

If you press N, the program continues to offer the next file. When all the filenames are read in, a flag is set by OSGBPB 8 and this signals the end of the routine. If you press Y, a carriage return is inserted after the filename, and OSCLI attempts to delete the file.

The only other key recognised is ESCAPE, which causes the program to terminate. (The OS will then recognise the ESCAPE key as having been pressed.)

This program was also developed on Murray's Electron and will work on a BBC B/B+ with ADFS, Master Series and Archimedes BBC Emulator. There is no reason why the program should not also work on Econet, although from what I remember, BBC NFS3.34 and 3.40 had a bug which did not correctly return the flag showing that the file list had ended, and instead it was necessary to check for a zero length filename. I believe there is no problem with the Master ANFS.

VIEW TIPS

Bruce Smith, fellow contributor and former technical editor of *BAU*, has always been a big fan of *View* but it has taken him five years of using the package to come up with this tip, which should save some mental anguish.

If you have some notes which you wish to leave on the screen whilst scrolling down the page and they can be accommodated in one line, then a good place to put them is in a user-defined ruler at the top of the page.

Simply press CTRL-F5 at the top of your document to generate a ruler, alter the length if you need to and then, using overtype mode, type your note(s) over the top of the ruler. *View* only seems to care about the asterisks (which represent tab stops) and the angle brackets (<and>) at each end of the ruler. The other characters, normally full stops, can apparently be any character other than an asterisk or an angle bracket.

So, you can type layout notes in the form of 'Indent 6 for subsections' or 'PB at item 24' or a more useful one might be, when preparing tables, to remember what each column is when preparing a table, for example.

As you scroll your headings off the top of the screen, they are preserved in the ruler as you move down.

Remember this text in the ruler is not printed out, so if you want these notes on paper, you must include them in the normal text as well.

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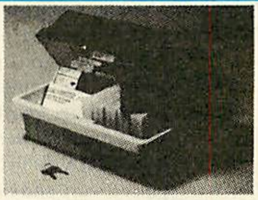
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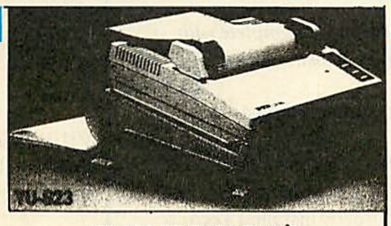
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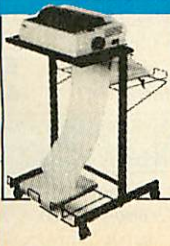


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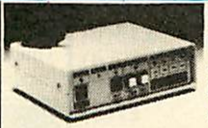
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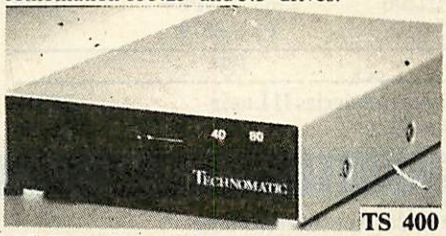
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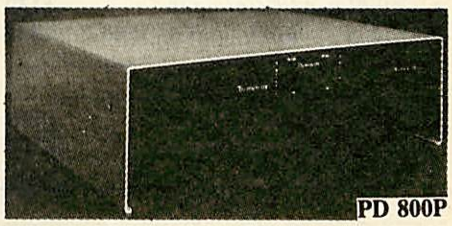
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Roland A3 FLATBED PLOTTERS

DXY880A	£510	DXY1100	£625
DXY1200	£865	DXY1300	£1025

All above items are carriage (a).

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LC24-10	£269	NB24-10	£449

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P2200 £269 P6+ £439

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Laserjet Series II Laser £1349

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SERIAL INTERFACES

Epson 8143	£32(d)	Epson 8148 (8K buffer)	£79(d)
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RIBBONS

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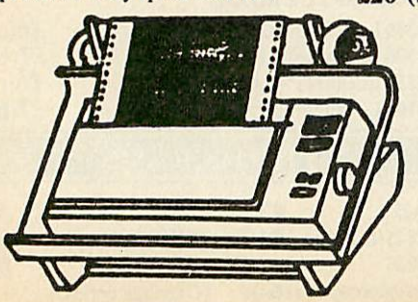
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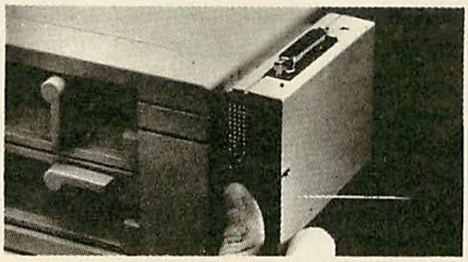


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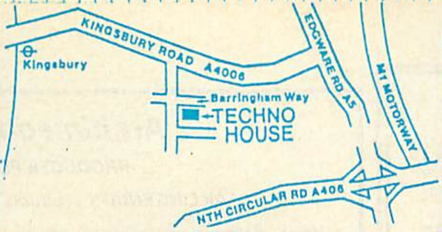
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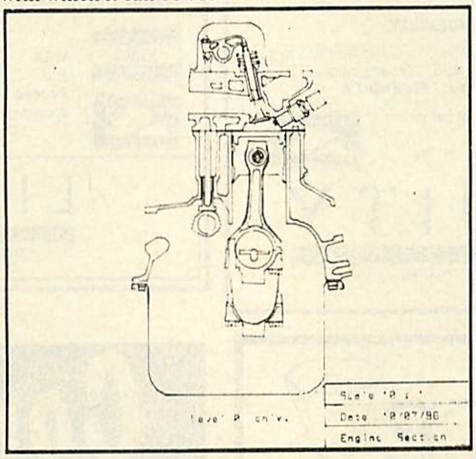
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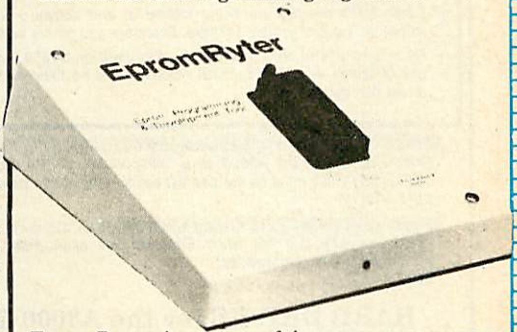
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GRAPHICS, ART, DESIGN & GAMES

Atelier	84	Autosketch	£69
Artisan	£31	Toolkit (Clares)	£31
Pro Artisan	£140	Zarch	£16
Support Disc	£16	Conquerer	£20
Toolkit (Beebug)	£32	Missile Control	£13
Arc Termulator	£56	Enthar Seven	£29
Alerian	£12	Lingenuity Presenter	24
Minotaur	£11	Freddys Folly	£12
Kermit	£46	Hoverbod	£12
Archeffect	£20	Ibix the Viking	£16
ArcTFS	£25	Jet Fighter	£12
Render Bender	£66	Orion	£12
Graphbox	£64	Thundermonk	£12
Gamma Plus	£60		
Graphic Writer	£23		

0% FINANCE

We are once again able to offer 0% finance for the purchase of an Archimedes Micro and some peripherals. For further details please write in or telephone
0923 37774 ext 203, 202 or 201

Desk Top Publisher

Acorn's Archi DTP Package £125

MINERVA's Archimedes Software

Sigmasheet	£57	System Delta+	£69
Deltabase	£24	Sales Ledger*	£53
Home Accounts*	£42	Purchase Ledger*	£53
Stock Manager*	£53	Reporter	£20
Nominal Ledger*	£53	Mailshot	£33
Ancestry	£59		
Gammaplot	£57		

System Delta + Reference Manual £25
Order Processing/Invoicing* £53
School Administrator £66
***Requires System Delta**

Archimedes RAM Upgrade

Archimedes as we all know is a very powerful micro. It's potentials are limitless. However, on the Basic 305, 310, 3000 and 410 series the lack of RAM restricts a user from making full use of the machines' power. Upto now the price of the RAM upgrades wer prohibitive but now Watford have come to your rescue by marketing RAM UPGRADES at affordable prices. For A3000 micro, Watford's 'BACKROOM BOYS', have even ingeniously designed a 4Meg memory upgrade card which no so long ago, Acorn had claimed to be an impossibility.

All our memory upgrades are simple to fit. No soldering required.

- A3000 Watford 1MB RAM Upgrade £159
- A3000 Watford 4MB RAM Upgrade £449
- A305/310 2Meg RAM Upgrade £325
- A305/310 4Meg RAM Upgrade £549
- A410/1 RAM Upgrade to 2 MB £149
- A410/1 RAM Upgrade to 4 MB £399

FINANCE AVAILABLE

In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details of finance terms please write or telephone 0923 37774 ext 203/201

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

WORDPROCESSORS

Wordwise +	£18	Pipedream	£89
Image Writer	£25	P. Spellchecker	£40
Interword ROM	£35	View	£49
1st Word Plus	£75	Viewspell	£32
Archie Spell Master	£39	ViewIndex	£12

DATABASES

AlphaBase	£39	Flying Start II	£80
Viewstore	£49	System's Delta+	£60

SPREADSHEETS

Intersheet ROM	£35	Viewsheet	£49
Sigmasheet			£59

BUSINESS GRAPHICS

GammaPlot	£59	Interchart ROM	£25

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics £94
Pipedream 3 – Wordprocessor, Database & Spreadsheet £TBA

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

Only £15

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

Watford's 20Meg & 40Meg Archimedes Hard Disc

Watford Electronics' 20Meg & 40Meg hard disc fits internally into the Winchester slot provided. It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions.
P.S. The 310 upgrade requires a backplane and a fan.

- 3HDP – Hard Disc Podule only £249
- 3HD20 – 20Meg Hard Disc for 310 £329
- 3HD40 – 40Meg Hard Disc for 310 £399
- 2 Podule backplane (Watford) £25
- 4 Podule backplane (Watford) £38
- Fan for the backplane £9
- 4HD20 – 20Meg Hard Disc for 410 £179
- 4HD40 – 40Meg Hard Disc for 410 £299
- A3000 Hard Disc Podule only £TBA
- A3000 20 Meg Hard Disc £TBA
- A3000 40 Meg Hard Disc £TBA

LANGUAGES (Archimedes)

ANSI 'C'; ISO-PASCAL; FORTRAN 77; all Release II. £94 each
Cambridge LISP; PROLOG X £181 each
LOGOTRON LOGO £55
BASIC Compiler £89
Archimedes Assembler £189
TWIN EDITOR £27

BBC MASTER

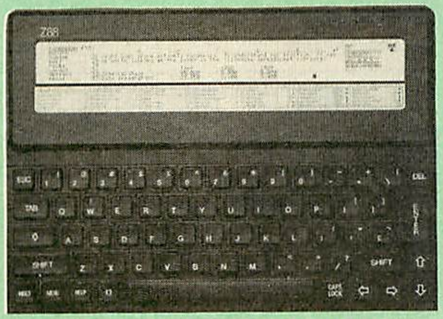
MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) *(carr £7)* **£439**

FREE... FREE... FREE...
Hardware and Software OFFER
AMX Mouse Mk III & SuperArt
plus
Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control. With every BBC Master purchased from us this month.

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£118
Econet Module for the Master	£49
Twin ROM Cartridge for Master	£8
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref. Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
ARIES' Professional IEEE Interface	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S **£899** Filestore E40s	£799
Filestore E60S **£1080** Ecolink	£270

Z88 Sinclair's Portable Micro



Watford Electronics are the largest Z88 Dealer in the UK

Only: £199

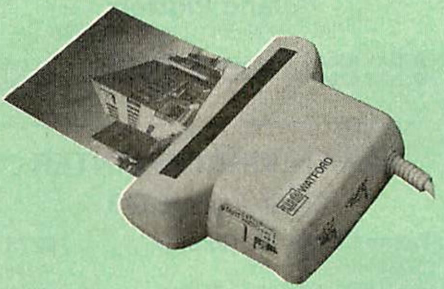
FREE
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

32K RAM Pack or 32K EPROM Pack	£17.35
128K RAM Pack or 128K ROM Pack	£43.40
512K RAM Pack	£169
Z88 Eprom Eraser Unit	£34.75
Z88 Pipedream Spellcheck (Colton)	£52
Z88 Spellmaster for Pipedream	£51
Z88 Carrying Case	£8.50
Z88 Computing Book	£9.95
AA Nicad Rechargable Battery	£1.50
Battery Charger Compact & Fast	£6
Z88 Serial Printer Cable	£8.65
Z88 Parallel Printer Cable	£24.00
● Z88 to BBC Link £22 ● Z BASE	£56
● Z88 to PC Link II £30 ● Z TAPE	£42
● Z88 to Macintosh £49 ● Z TERM	£42
● Z88 Mains Adaptor £8.65 ● Z88 Modem	£145

NEW

Archie Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y directions separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

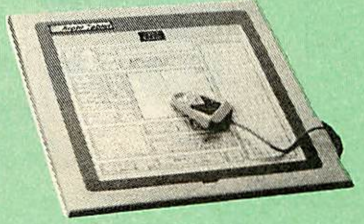
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

Launch offer £149

NEW

Archi Graphic Tablet



This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this post itself.

Graphics programs such as Artisan, Pro Artisan, AutoSketch, Oak DTP, and the RiscOS Draw, Paint and DTP packages are considerably enhanced by the use of the graphics tablet as opposed to the mouse, although it can, of course, be used with any other mouse driven application.

The software allows the user to define how much of the tablet's 12" x 12" working area to use, allowing very fine control when drawing freehand or tracing from a variety of differently sized drawings, diagrams, photographs, etc.

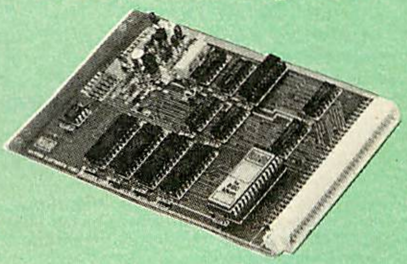
The tablet driver is compatible with all Archimedes machines, and with both Arthur and RiscOS operating systems.

The pointer is moved via a four button puck complete with transparent lens and crosshairs for optimum accuracy. Three of the buttons emulate the Archimedes mouse buttons precisely, the fourth being used for special functions such as setting the position and size of the active working area. The buttons may be re-mapped to allow the relationship between tablet and mouse buttons to be redefined, should this be required.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

Launch Price £259
(Price includes Tablet, leads and software)

Archimedes Real-Time Digitiser



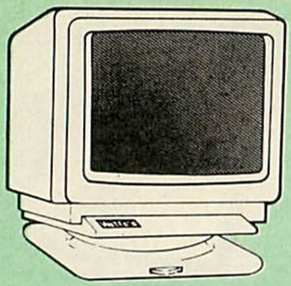
Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Please write in for further details.

Price £249

Continued →

MONITORS



MICROVITEC 14"

- **1431** – Standard resolution as used on the BBC television computer programme **£175**
- **1451** – Medium resolution, suitable for word processing in mode 0 **£219**
- **1441** – High res, exceeds the capabilities of the BBC micro **£359**
- **1431AP** RGB + PAL and AUDIO **£199**
- **1451AP** RGB + PAL and AUDIO **£255**
- **2030 CS** 20" Med Res **£399**
- **2040 CS** 20" Hi Res **£675**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**

14" MULTISCAN COLOUR

- **TAXAN** Multisync 770 Plus **£425**
- **TAXAN** Multiscan 870 16" Monitor **£575**
- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 **£429**
- **EIZO** 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch **£469**

TAXAN 12"

- Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch **£269**
- KX117 – Hi-Res Green Screen Monitor **£79**

PHILIPS

- **BM7502** 12" Hi-res Green Monitor **£64**
- **CM8833** 14" Med. Res Colour Monitor **£195**

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

Dust Cover for Phillips Monitors **£6**

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**
Archimedes Colour Monitor Lead	**£7.50**

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

Price £12

PLOTTERS

- Plotmate A4S **£379**
- Plotmate A3M **£549**

Roland Plotters

(Official Roland Appointed Distributor)

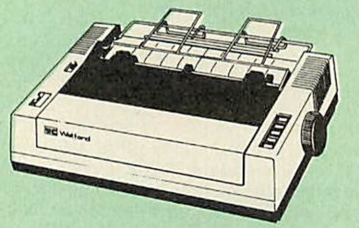
- **DXY 880A** **£560**
- **DXY 1100** **£630**
- **DXY 1200** **£879**
- **DXY 1300** **£1035**

TAXAN KP-815 PRINTER

Offer Price £149

Taxan KP915 132 Column	**£275**
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

Panasonic KX-P1081



UK's most popular printer.

SUMMER SALE OFFER only: **£135**

Optional RS232 Interface: **£39**

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

KX-P1180 Printer Offer

This month we are glad to be able to offer a special deal on this superb printer. Not only have we reduced the price but we are also giving away our highly acclaimed Dump Out 3, the BBC screen Dump Rom and a printer lead worth £35, FREE with every machine.

Offer Price £146

Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS **£249**
- **KX-P1180** 9pin 80col. 192/38 CPS **£146**
- **KX-P1540** 24pin 136col. 240/80 CPS **£435**
- **KX-P1592** 9pin 136col. 216/45 CPS **£275**
- **KX-P1595** 9pin 136col. 288/61 CPS **£355**

- **Panasonic KX-P4450** LASER PRINTER Latest technology at Watford's special offer price **£1,349**

- Spare Toner **£29**
- A4 Feeder **£55**
- Drum Unit **£149**
- Developer **£115**

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32) **£175**; KX-P1540 (P35) **£185**
KX-P1124 (P36) **£88**; KX-P1180 (P37) **£79**

BUFFERS

P12	4K Buffer Board for 1081	**£55**
P42	32K Buffer Chip for 1592/1595	**£49**
P43	32K Buffer Chip for 1540/1124	**£49**

Serial Interfaces

P17 P1081/1592 **£32** P19 P1124/1180 **£55**

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081; 1592 & 1595 **£8**
P115 for KX-P1180 **£8** P145 for KX-P1124 **£8**
P140 for KX-P1540 **£10**

INTEGREX COLOUR JET

- Colour Jet 132 Printer **£515**
- Paper Roll **£6.50**
- Screen Dump Software **£10**
- Colour Cartridge **£16.50**
- Black Cartridge **£10.35**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£123**

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer **£2,695**

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

£269

Pinwriter Serial Interface (optional)	**£55**
P2200 Cut Sheet Feeder	**£59**
Additional Font Cartridge	***£25***
NEC P2200 Pinwriter Ribbon	**£6**

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns **£439** NEC P7+ 136 columns **£575**
Colour Option **£74** Serial Interface **£73**
Cut Sheet Feeder **£125**
NEC Ribbons for P6 **£8**; P7 **£9.50**

Don't miss our open day. For details please see Page 1 or our advert.

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

Star Printers

Star LC10	**£145**
LC10 Colour	**£195**
XB24-10 Colour	**£425**
Star LC24-10	**£269**
NB24-10	**£425**
LC10 Colour Ribbon	**£6**
Cut Sheet Feeder	**£65**

EPSON PRINTERS

EX800	**£410**	LQ850	**£430**
EX1000	**£564**	LQ860	**£539**
FX850	**£279**	LQ1050	**£549**
FX1000	**£425**	LQ1060	**£679**
FX1050	**£395**	LQ2550+	**£895**
FX1060	**£679**	LQ2500+	**£839**
LQ500	**£239**	LX800	**£142**
LQ550	**£245**	SQ2500	**£899**
GQ3500 Laser	**£1150**		

CUT SHEET FEEDERS for

EX800 **£149**; FX800/LQ800 **£149**; FX850/LQ850 **£149**; FX1000/LQ1000 **£179**; LQ500/LX800 **£79**; LQ1050 **£175**; LQ2550 **£390.**

TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90**

ACCESSORIES

- EX800/1000 Colour Option **£55**
- EX800/1000 Colour Ribbon **£18**
- LQ2500 Colour Option **£65**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£32**	RS232 + 2K Buffer	**£52**
IEEE 488	**£40**	RS232 + 8K Buffer	**£79**

PRINTER LEADS

BBC Centronics 4' long	**£5**
BBC Centronics 6' extra long	**£7**
Compact's Special Centronics Lead	**£7**
Archimedes Printer Lead 1 meter	**£6**
Nimbus Centronics Lead	**£12**
IBM Parallel Lead 1 meter	**£6**
Double Ended 36 way Centronic Lead 4'	**£7**
Double Ended 36 way Centronics Lead 6'	**£9**
MSX Centronics Parallel Lead 4'	**£12**
RS232 Leads (Various)	**P.O.A.**

Listing Paper (Perforated)

- 1,000 Sheets 9½" × 11" Fanfold Paper £7
- 2,000 Sheets 9½" × 11" Fanfold Paper £12
- 1000 Sheets 9½" x 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" × 11" Fanfold Paper £9
- 1000 Sheets true A4 Fanfold Paper 70gms £11
- 2000 Sheets true A4 Fanfold Paper 70gms £19
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

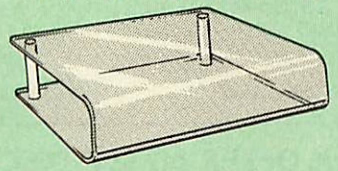
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000	90 × 36mm (Single Row)	**£5.00**
1,000	90 × 36mm (Twin Row)	**£4.90**
1,000	90 × 49mm (Twin Row)	**£7.50**
1,000	102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 *(carr. £3)*
132 Column version £26 *(carr. £4)*

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
IBM PCs pair	–	£6.00
RX/FX80/MX80	£3.00	
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£7.50	£5.00
RX/FX80/85/800/MX80	£3.90	–
RX/FX100/1000	£5.75	–
Kaga/Taxan KP810/815	£4.90	£5.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£8.50	£5.50
LX80/86/800	£3.80	£4.50
M1009/GLP	£3.80	£3.75
Panasonic KX1080/81	£4.00	£4.75
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

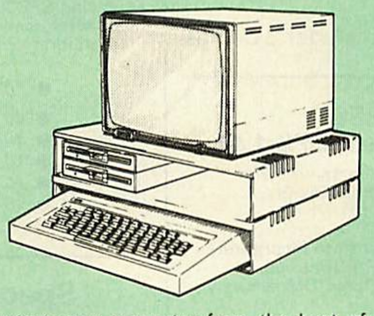
Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.
(Ideal for School environments.)

Connects	Serial	Centronics
2 to 1	£20	£22
3 to 1	£27	£30
5 to 1	£36	£39

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



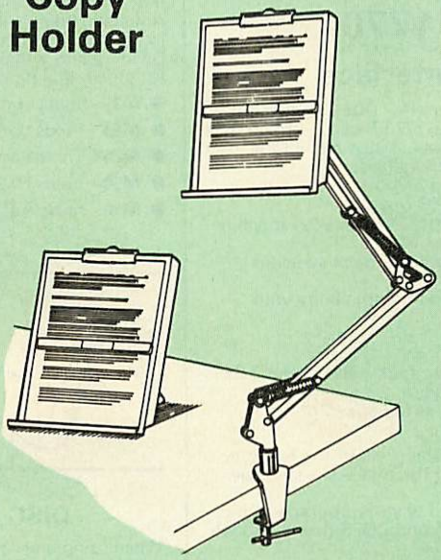
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

NEW

Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics **£20**
Compact AB Switch RS232 **£19**
(Cables extra at £6 each)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

Only £149 (carr £5)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

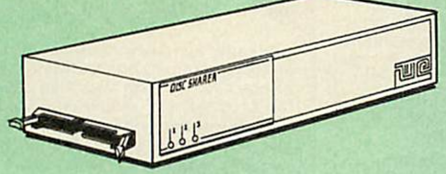
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued →

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** — Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's DFSs

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

NEW

Watford's MkII 1770

Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

- SPECIAL PRICE **£44.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.25** Twin CD (with PSU) **£3.90**

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5.25" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5.25" D/S D/D 40 Track Diskettes (745)* ***£7.00***
- *10 × 5.25" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5.25" D/S D/D 80 Track Diskettes (747)* ***£11.00***
- *10 × 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£16***
- *10 × 3.5" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3.5" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3.5" High Density Diskettes* ***£25***

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 ×* ***M3*** *3.5" D/S D/D 80 Track Discs* ***£10***
- *10 ×* ***M9*** *3.5" Double Side High Density* ***£25***
- *10 ×* ***M4*** *5.25" S/S D/D 40 Track Discs* ***£5***
- *10 ×* ***M5*** *5.25" D/S D/D 40 Track Discs* ***£7***
- *10 ×* ***M7*** *5.25" D/S D/D 80 Track Discs* ***£9***
- *10 ×* ***M8*** *5.25" D/S H/D Hi-Density Discs* ***£14***
- *3" Double Sided Discs* ***£2.50*** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
Without Sleeves	£35	£39	£45
With Sleeves	£38	£42	£48

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

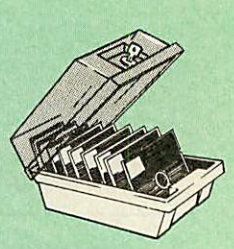
Price £4

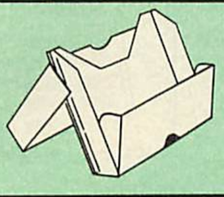
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£4.95**
- **M85** – holds upto 95 5¼" discs **£6.95**
- **M25*** – holds upto 25 3 ½" Discs **£4.95**
- **M50** – holds 50 3½" Discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable





PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK



When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds upto eight 5¼" discs.

Protection at Only: **£2**

DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket. **£4**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

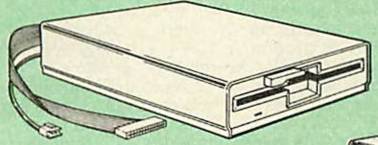
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

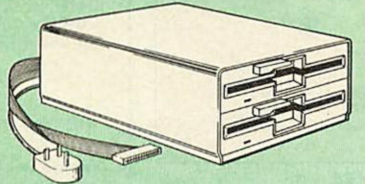
*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.** We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today)!*

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £75	CLD 400 £168	CS 400S £85	CD400 £188
800K (1.44M)		CLD 800S £153		CD 800S £163

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

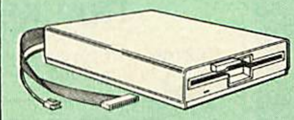
Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double aensity); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

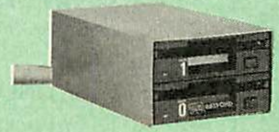
Special 40/80 Disc Drive/DDFS Mk II Offer



● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
● A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

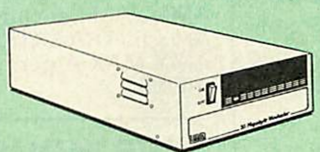
Drives to connect to BBC Micros own PSU

● **CLS35 400K Unit £69** ● **CLD35 Twin 800K £125**

Drives with built-in Power Suply Unit

● **CS35 Single 400K £85** ● **CD35 Twin 800K £135**

WATFORD's WINCHESTER DRIVES



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

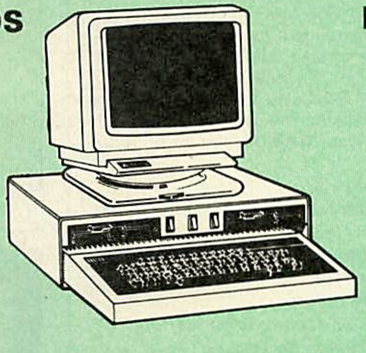
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£405** (carr £9)

CDPM 800S DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £182

A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800 for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint **£58**
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont **£89**
- Quest Mouse II only **£29**
- Quest Paint Software only **£34**
- Quest Font Disc **£15**
- Quest Mouse Mat (Red or Blue or Green please specify) **£3**
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only **£22**
- GXR ROM for the BBC Micro **£22**

(P.S. Quest Paint is not compatible with BBC Compact)

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro **£39**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible) £45
RB2 including Quest Paint £75

THE NEW Mk III AMX MOUSE

Inc. Super Art package

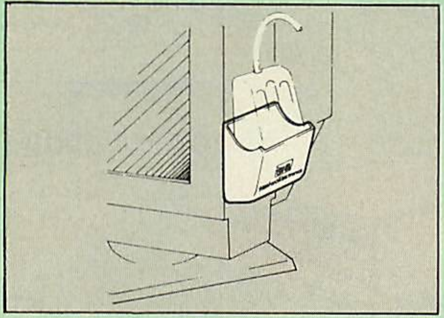
ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX UTILITY Package	**£13**
AMX SUPERART Package	**£34**
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	**£32**
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	**£13**
AMX DESIGN (ROM)	**£55**
AMX XAM Educational	**£15**
AMX EXTRA EXTRA	**£16**
AMX MAX A gem of desktop (ROM)	**£15**

WE MOUSE HOUSE

Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, Monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.



Price £4



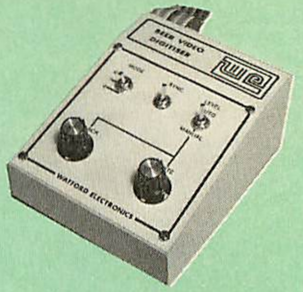
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	**£33**
Software pack for the Master	**£39**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.
The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.
A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)
(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of Stop Press and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)



The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantge of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, detailed elsewhere in our advert, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-past, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designedto take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

For convenience all types of file may be stored on the same disc, with the software intelligently and transparently distinguishing between them. Filenames are picked off the screen with the mouse, despensing with keyboard entry wherever possible.

"The Wapping Editor combines sophistication with ease of use and power with simplicity, to make it the most comprehensive and user-friendly DTP system ever likely to be written for the Beeb".

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

NEW

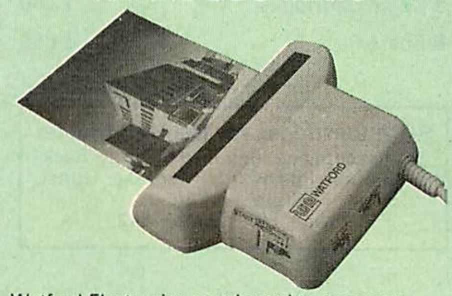
Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games, etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.
There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.
A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routines you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer for the BBC Micro computer.
The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilitiesis provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various type of dithering may be selected to simulate the grey levels of a scanned picture. All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware	**£135**

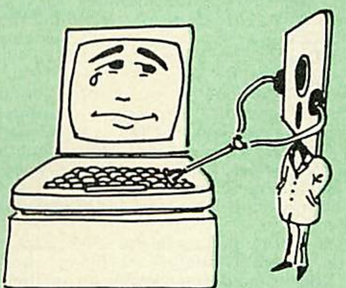
NEW

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

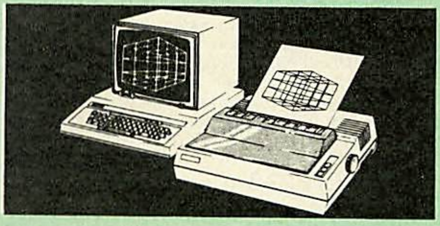
DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS432, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

Continued →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £2)

Aries B-12 Sideways ROM Board

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:		
	Aries B-12	**£36**
	Aries B-12C	**£5**

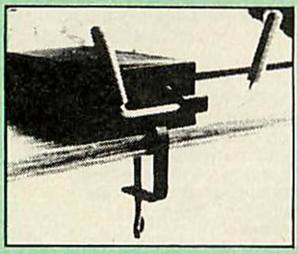
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

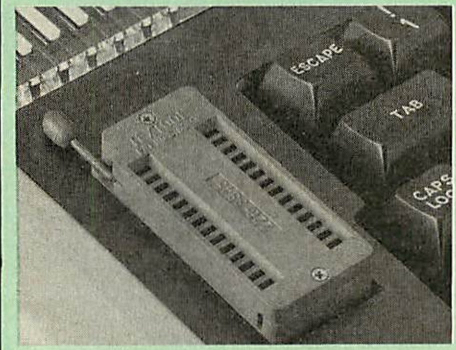
VOLTMACE JOYSTICKS

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	**£25**
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£26**

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc.
Twin **£8**; Quad **£12**

16K DISC RAM

(16K Sideways RAM Module)

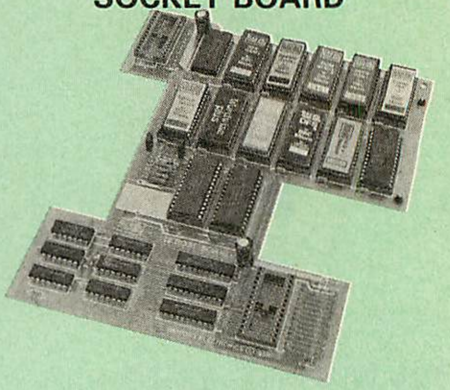
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£32** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

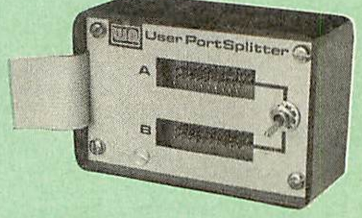
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery backup fitted **£39**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

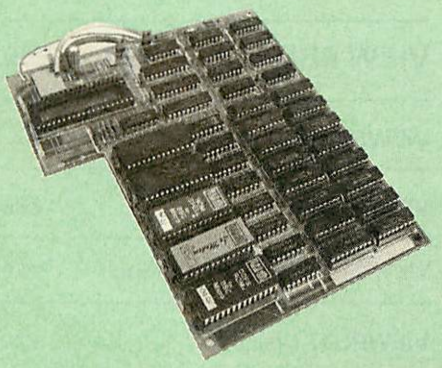
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£48***
- ROM/RAM card with 64k dynamic RAM ***£65***
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£10**
- 16k Dynamic RAM for Upgrade **£17.50**
- Battery backup **£3**
- Read and Write protect switches .... **£2 each**

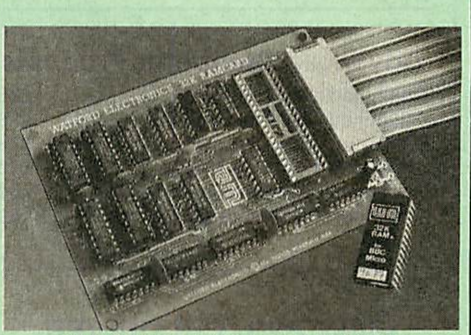
Complete ROM-RAM board All options installed **£115**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Don't miss our open day. For details please see Page 1 or our advert.

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

Educational Software

FUN SCHOOL 2 – Red:
6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump. **£11**

FUN SCHOOL 2 – Green:
Over 8 yrs – Eight programs on Disc. Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£11.25**

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49

Wordwise £26

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

INTERBASE £49

All Prices Exclusive of VAT

MINI OFFICE II

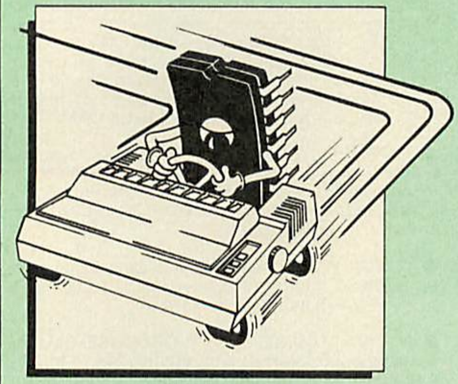
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
Disc Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

Advanced Computer Products

Advanced Disc Toolkit	£30
Advanced Disc Investigator	£25
Advanced 1770 DFS BBC	£29
Advanced 1770 DFS Master	£30
Advanced File Manager	£25.00
Advanced Control Panel	£30.00

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

VIEW WORDPROCESSOR 2.1	**£35**
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£59**
VIEWSHEET (Acornsoft)	**£36**
VIEWSTORE	**£36**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£20**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2	**£69**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
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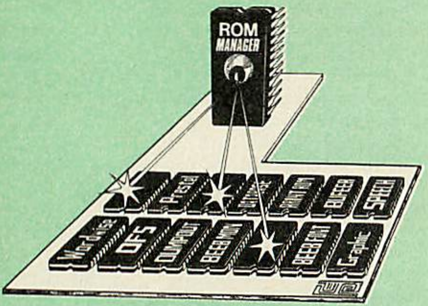
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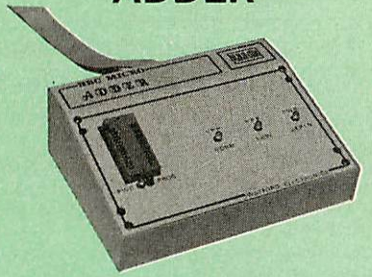
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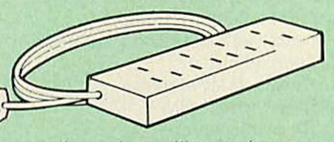
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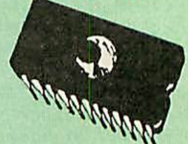
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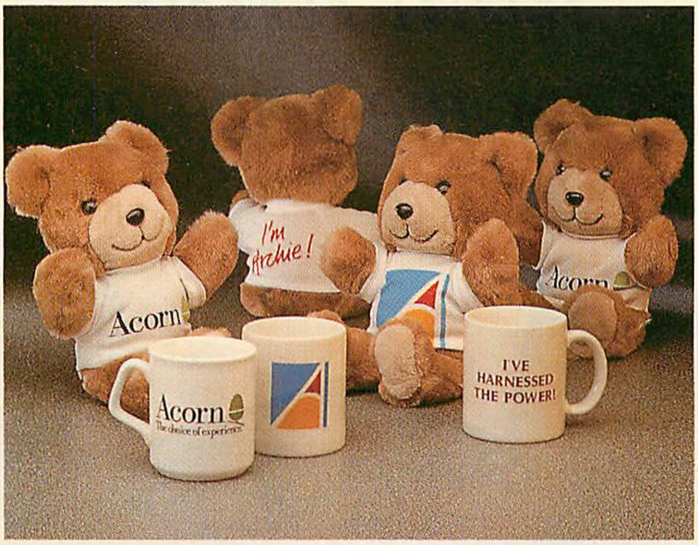
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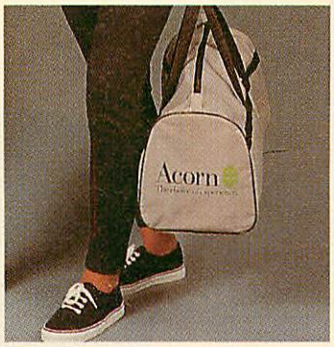
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POINTS OF VIEW

A new program makes pointing your satellite dish in the right direction an awful lot easier

Michael Leete

ILLUSTRATION BY ANGELA WOOD

As the advertising hype gets under way, satellite television is expected to boom like home computers and VCRs. Certainly there is the same bewildering choice facing the novice along with a brand new jargon of terrifying words and mnemonics.

Many readers may already have suffered the cost of choosing an unsuitable computer some few years ago and anyone who was convinced that Betamax was superior to the less expensive VHS may well still be the less than proud owners of a quantity of electronic junk and useless 'software' – the video tapes.

The difficulty is that knowledge only comes from 'hands on' experience, which is seldom cheap.

Before getting into the technical jungle, prospective purchasers need to know if their position is physically suitable for satellite TV reception.

Above all, reception depends on a completely unobstructed 'view' of the satellite. A telegraph pole or even leaves on a tree can distort the signal and make viewing impossible. It seems sensible, therefore, to have a good idea of where the satellites actually are so you know where your dish should be pointing.

A large number of communications satellites are winging through space at about 11,000 kph some 36,000 km above the equator in an area known as the Clarke Belt. Their exact speed is matched to that of the rotating earth so they appear to us to be stationary – they are in a geostationary orbit.

A satellite located due south of an observer has the highest apparent elevation and the Clarke Belt arcs towards the horizon towards the east and west. Part of this arc may well be masked, at any given position at ground level, by hills, trees or the local gas works.

The utility in the yellow pages was first written for a chain of TV shops. The idea was to do a print-out for every enquiry to help customers decide on the suitability of their proposed sites.



Adjusting a roof-mounted satellite dish



The utility at work with example location

Data is included for a few satellites and, by increasing the number read at line 390, more can be added as they come into service at different locations.

As a word of warning, the program is only intended to give a rough idea of the elevation and azimuth of the chosen satellites. It is not, and could never be, a substitute for a proper reading from a signal strength meter when actually installing the dish antenna, BSB squariel or Sir Clive's squish.

You may initially only be interested in reception from Astra 1A and the forthcoming BSB (British Satellite Broadcasting) satellites, but their orbital locations are over 50 degrees of longitude apart – something around 22,000 miles in space. Between them lie several interesting satellites beaming TV microwaves in roughly the right direction.

Although the English language satellite programmes may offer a wider choice at a particular moment in time, their programme content is largely covered by the existing network. In the long term, therefore, the more flexible equipment, capable of receiving from the widest possible range of satellites, would seem to be the safest purchase.

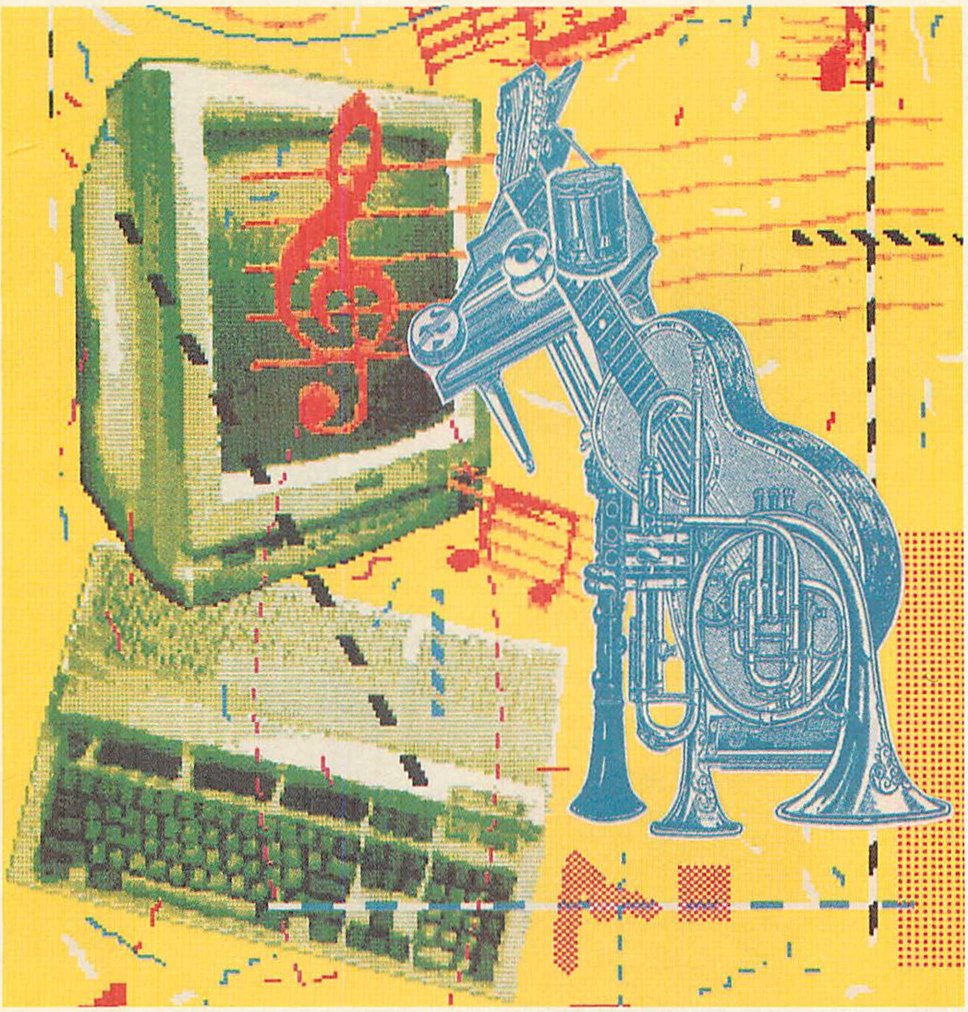
All you need to know to use the program is where you are, in degrees of latitude and longitude. I was told at school that, since latitude derived from the Latin word meaning broad, it was easy to remember which was which. However, since a fair definition of a sphere is that an object is as broad as it is long, this allusion to my classical education which been no help at all.

In English, longitude is the smaller figure read from the top or bottom of a map and latitude. (Lizard Point excluded) is something over 50 degrees. The input calls for commas to be inserted after the degrees and the minutes.

The selected satellites range from Intelsat VF5 in the east which has so far beamed only one programme of horse racing from Hong Kong into Western Europe, to Intelsat VF4, carrying Spanish Channels to the Canary Islands off the coast of Africa, in the west.

In between, about 10 new satellites are already planned but only BSB 1 has been included in the data. The other satellites have been chosen because they are likely to produce some pictures from a larger dish. The data may, of course, be altered to suit any need.

Orbital locations may be found in a number of sources (which seldom agree with each other) so a little fine tuning of the data may be necessary.



TAKE NOTE

We can't promise you a recording contract but you can get down and boogie to our computer composition program

Dave Acton

The links between computers and music are many and varied. At one end of the scale you might place the repetitive (and endlessly jolly) tunes that accompany games. At the other, computers have been used to 'compose' classical music.

Far from new is the idea that a machine could produce original music using nothing but some random element and the skill of its creator.

Perhaps the first to try was the priest and mathematician Athanasius Kircher who, as early as 1650 described a composing machine in his *Musurgia Universalis.*

Many similar attempts followed including a famous booklet containing 'segments' of waltzes that could be arranged into original pieces by casting dice. Whether this work can truly be attributed to Mozart himself is a matter of conjecture but, without doubt, even centuries ago people's imaginations were ignited by the possibility of music conjured up from random numbers.

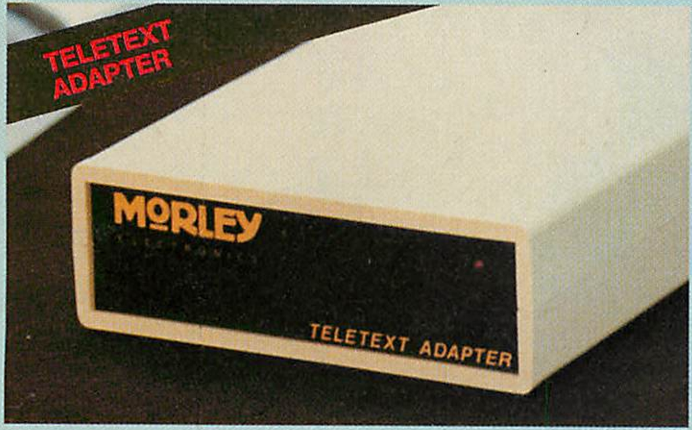
It was inevitable that the appearance of computers in the 1950s would forever affect the course of 'random music'. Here were machines not just capable of 'throwing dice' at considerable speed but also of taking the hard work out of choosing notes according to a set of pre-determined rules.

In 1955 a then high-speed computer called ILLIAC produced a piece of two-part counterpoint. This, I suppose, was the first real computer-composed tune.

But how can a machine produce something as ethereal as music? How can the creative element of the human imagination be simulated by selections of random numbers? One simple method

ILLUSTRATION BY PAUL ALLEN

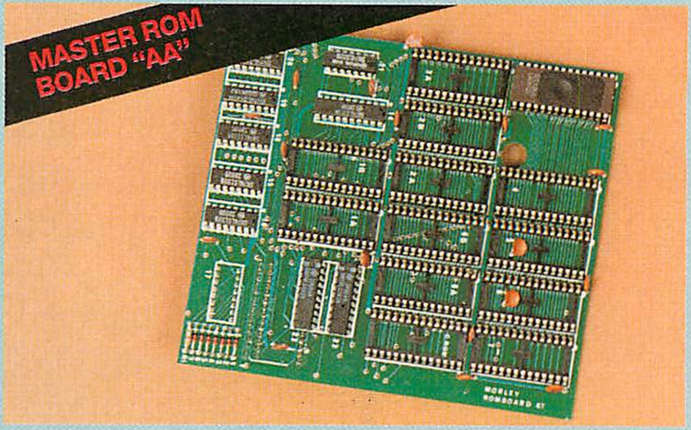
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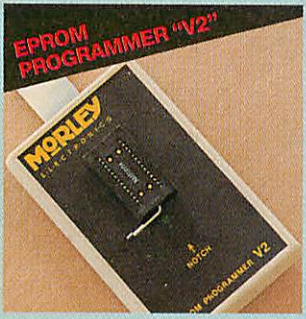
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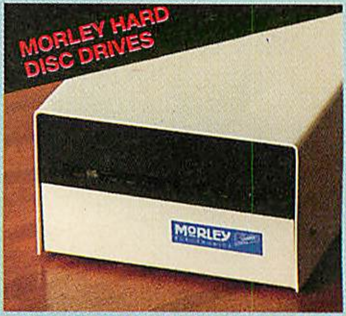
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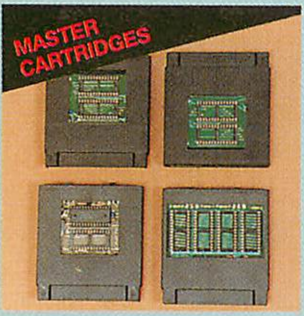


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quoted in many books uses the idea of probability distribution tables.

Essentially the idea is this. Many tunes of a particular style or by a particular composer are analysed to find out which different notes are used and with what frequency. Then, the probability table produced can be used to play a 'random' tune in the style of the original.

In the simplest form, if middle-C is chosen in the original tunes, say, 10 per cent of the time, the random tune must be created in such a way that the probability of any given note being middle-C is also 10 per cent.

The 'order' of the probability table can be increased to produce a more realistic result. For each note x we ask 'what is the probability that it will be followed by note y? The larger table formed can be used to compose a tune which sounds more like the originals.

Higher order tables can also be used – 'if note x then note y are played, what is the chance that note z will follow?' – and so on. The results of random music composed in this way vary from the incoherent melodies produced with low-order tables to virtual copies of the original music using the higher-order ones. It's a nice idea but it's only really a 'cheap' trick – the computer has no idea why any note is better than another, merely that a previous composer thought so at one instant.

Similar probability tables could be created to write prose by feeding the computer with, say, the complete works of Shakespeare. Occasionally, like the proverbial monkeys with their proverbial typewriters, a recognisable sentence would trickle out of a sea of gibberish.

The idea of piecing musical 'segments' in a random way can produce pleasing results although it is really a bit of a cheap trick too.

Feeding a computer with such segments and some rules about how they might be used is a little more intelligent than using probability tables. Here, albeit in a small way, the computer is provided with some idea of harmony. Although the segments have to be pre-written by human hand, the computer does have a clue about how they might fit together.

A (somewhat trivial) example of the use of random musical segments was used in the *Wizalon* game in a past issue of *BBC Acorn User*. For the benefit of those who missed this musical masterpiece, I've knocked together an equally and unashamedly trivial demonstration of the idea – listing 1 on the yellow pages. Details of how listing 1 (or Segment) works are given in the box.

You may be interested to know that to be sure to hear every 12-bar permutation that Segment can generate you would need to listen for at least 800 thousand years. It's possible, of course, that the finest variation the program can produce will happen in half-a-million years or so. Personally though, I wouldn't hold your breath in anticipation ...

We're still in the realm of musical tricks. True, listing 1 has some idea of harmony but it still stops a long way short of true composition.

A true random-music program would create every aspect of music randomly – the rhythms, melodies, and harmonies. The tempo would be varied where necessary and even the instruments would need to be chosen by the program.

To do all this is asking rather a lot, especially of a humble home micro. Furthermore, even a human composer relies on a great number of predetermined rules. People writing music are influenced by their contemporaries and their predecessors. They are affected by public taste, by culture and tradition – by widespread (though mainly unstated) laws of what is right and what is wrong.

It would be unfair not to give a computer an idea or two about what is accepted as 'good' musically before presenting it with a blank piece of manuscript paper.

It had occurred to me that the best example for a computer-generated piece of music would be something 17th century-ish, with a good helping of counterpoint – a canon perhaps, where the rules of acceptability are a little more clearly defined than with other styles. Alas, my experiments did not bear particularly authentic fruit.

Aside from any limitations in the programming techniques employed (and I'll happily concede there are many) it seems that in some ways the more rigid the rules of composition, the less successful a computer will be in producing a piece of any merit.

The argument runs like this. If a computer has 'free reign' to select almost any note it chooses, it will produce a lot of rubbish (like the monkeys and their typewriters) but has the opportunity to come up with something surprisingly good that might not have occurred to

HOW SEGMENT WORKS

Listing 1 on the yellow pages produces a random tune from pre-defined musical segments. It works on both BBC and Archimedes machines, although differences in the way sounds are produced on the Beeb and Arc mean certain parts of the program are present in two versions.

A flag called arc% is set at the start to TRUE or FALSE. This depends on whether the machine is an Archimedes or not. This is done with a simple test on HIMEM although you might like to set arc% explicitly.

The segments are stored at the end of the program in DATA statements. Each note has been compacted into a single byte and the collections of such bytes are given as hexadecimal strings.

Each is preceded by a 'type' number which describes where and when the phrase may be played. In all, there are five different types of phrases.

The whole tune lasts forever though it really consists of 12 segments repeated continually. The permitted segment type for each of the twelve bars is given in the first DATA statement.

Three voices are used. Two play a fixed bass pattern given as data at the end of the program. The other plays the randomly chosen segments. The array, time% contains the time (in centiseconds) at which the next note for each voice is due to be sounded.

The actual random selection of phrases is done by PROCNEWPHRASE, which simply uses the Basic RND function to choose a valid segment from the 36 that have been read into the array, phrase$.

Note that Archimedes machines will play the melody using the WAVESYNTH-BEEP effect and the accompaniment with STRINGLIB-SOFT. The volumes used by the Arc are stored in vol%. BBC and Master machines play the melody and accompaniment using the envelopes defined in PROCINITBEEB.

To add a little more variety to the piece, the overall key is changed from time to time. This is determined by the variable off% which is added to all pitches before generating sounds.

Key changing is a simple way of spicing-up a computer-generated tune, although you might like to try more complex methods rather than simply switching from one key to another.

anyone in a thousand decades.

On the other hand, too many rules will cramp the computer's style and produce mediocre results.

Furthermore, any piece of music worth its salt breaks the rules anyway, or at least, redefines them. When a machine is fed with rules governing composition they immediately become fixed whereas in the human world they are always constantly changing.

As an aside, consider listing 2, Impro, which attempts a little improvisation. It has been provided with some basic rules. For example, the key of the music is fixed for each of the 16 bars it composes. Also, the (very simple) bass line is fixed. The program creates one or two melody lines to 'fit upon' the bass line using rules to determine rhythm and harmony of equal simplicity.

The results vary widely. Occasionally it comes up with something rather interesting, sometimes a tune that's quite appalling! So do persevere with Impro. Details of how the listing works are given in the box on this page.

All-in-all, Impro produces pretty bland tunes by human standards. This is the result of being bound by many rules and limited in the choice of rhythms.

There are many ways in which you might like to experiment with alternative rules however. New rhythms could be added or weight given to particular rhythm patterns. Greater melodic freedom could be provided by altering the 'range' parameters passed to FNseq. Also, the key used in each bar could be varied randomly rather than being fixed.

You may also realise that the key of a particular bar is dealt with rather stupidly at the time of playing. Like listing 1, key is varied merely by changing the value of an offset which is added to the pitch of a SOUND statement.

To deal with key properly one would really need to incorporate it within the harmonising process. This would also mean that changes from one key to another would be smoother because the composition part of the program would see such a change coming.

Finally, you might like to consider the prospect of using a minor key. This is rather more complicated than using a major one, particularly regarding melody. In general, going up the 'melodic' minor scale is a little different pitch-wise to coming back down and this would need to be taken into consideration.

Having made such improvements, would we really be any closer to creating a machine that itself was capable of writing original and valid music? Much though I would like to think so, I'm afraid the factors that go towards making a 'good tune' will always be a little beyond mechanical minds. However, this does not invalidate the exercise – far from it!

Experimenting with computer music, apart from being a thoroughly enjoyable activity, can reveal a great deal about which part of music belongs to the creative imagination and which part to the rulebook.

Here's a little hypothesis to finish with: *no computer will ever produce a really 'good' piece of music because such a machine is not capable of realising when it has done so.* Well? Happy composing ...

HOW IMPRO WORKS

Listing 2 improvises a melody given a fixed bass line. Like listing 1, the variable arc% is used to accommodate differences between the BBC and Archimedes machines. Because the sound produced by the Beeb is rather 'lacklustre' compared to that of the Arc, only one melody line is composed on it. Archimedes users can enjoy two melody lines running together.

Several key variables are defined at the start and their names should reveal their function. Only two DATA statements are used. The first defines a simple major scale which is used for harmonisation. The second defines the key structure. The arrays, pitch% and dur% are used to contain the pitch and length of each note chosen.

Overall harmony within the program is governed by the array, harmony%. There is an entry in this array for each point in the tune and for each possible note of the scale at every such point.

This is simply TRUE or FALSE. If TRUE then that is a valid pitch to choose at that stage of the composition.

To allow the computer some freedom while keeping it sufficiently in check, notes at key stages (every four units of time, or every crotchet) are only allowed to be chosen from three special notes – the 'tonic', 'mediant' and 'dominant'.

In the case of the C major key, these notes are C, E and G respectively. In between these stages of the tune, any note from the major scale can be chosen.

The bass line is very simple indeed and is created by PROCmakebass. The melody lines are created by PROCMAKEMELODY which is a little more complex.

Basically, rhythm patterns are chosen at random, pitches are chosen to go with the rhythms and the whole process continues until the bar of music has been created. The tune is in 6/8 time and to provide some structure to the piece, only four types of rhythm pattern are available. These are chosen with equal probability and are dealt with by the functions FNA to FND.

These functions make use of FNSEQ which composes (or at least, attempts to compose) a piece of the melodic line according to the parameters provided.

These parameters determine not only the length of note required but also the range of notes in which the melody must lie and the degree to which the pitch may change from note to note. This is necessary to avoid voices going off the rails or wavering about violently.

The operation of FNSEQ is roughly as follows. The sequence is based on a 'current' pitch – curpitch%. A 'destination' note is chosen using FNRANDOMNOTE. This is the pitch we're aiming for. Having chosen the end point, the notes in between are selected according to the rules of harmony described above.

The range% parameter determines how far the destination note may be from the current one. The minrange% parameter indicates a minimum distance between current and destination pitches. (This may be used to make the melody go somewhere definite rather than just hang around!) Finally, the smallrange% parameter specifies the maximum jump allowed from one step in the sequence to the next.

So that the composition process doesn't get stuck, FNRANDOMNOTE stretches the rules a little if it cannot find a suitable note. That is, given a particular range, if it cannot come up with a suitable pitch for the next note, the range is stretched until it can. Also, the variable fail% is used by FNSEQ to keep track of the number of times it couldn't produce a suitable sequence of notes. If this number exceeds 10 then FNSEQ returns a value of FALSE which is passed back to PROCmakemelody.

The program will keep retrying until a suitable melodic line is found.

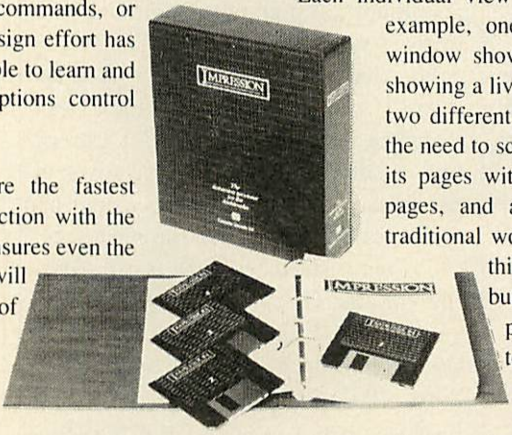
Designed, & typeset

Impression is more than a word processor, it can handle complete documents ranging from whole books, newsletters, or technical articles, to single page advertisements. It can handle all aspects of the final printed result - the text, line graphics, photographs, company logos etc. Yet it can still be used to bash out a single page of text as well as any 'simple' word processor. It is a document processor.

RISCOS

Impression is one of the first products to take full advantage of the new multi-tasking WIMP based operating system for the Archimedes. Because it uses the windowing/pointer/menu facilities the product is simple and intuitive to use - long gone are the days when users had to remember commands, or codes for each operation. Considerable design effort has been expended on making the program simple to learn and simple to use - only five main menu options control everything within Impresson.

Impression has been optimised to ensure the fastest possible screen update and this, in conjunction with the very responsive windowing environment, ensures even the most experienced word processor user will gain considerable benefits from this form of control.



Frames

Impression is a frame based page layout system. All objects on the page are held within frames which may be positioned freely anywhere on the page. Frames can contain text or graphics, they may overlap, and may be transparent or have any coloured background. They can have a variety of borders displayed around them and may be arranged in columns to create multi-columned text. Text may be forced to automatically repel around any frame so enabling text to flow around graphics.

A text frame may be linked to any other text frame (even on subsequent pages) so text will automatically flow from frame to frame and page to page. Since Impression has been designed primarily as a word processor, it is important that users can enter text unhindered. Therefore frames and pages can be created automatically as text flows out of a frame, ensuring that while text is being entered you do not have to worry about creating new frames or pages.

Graphics frames may contain any sprite (for example images from Scan-Light) or any Draw file. All graphic frames may have the picture scaled within the frame to any degree. In addition the aspect ratio of pictures can be controlled and even locked to any required value.

Windows

Impression can handle up to 16 documents in memory at any one time. Each document may be viewed in one or more windows. Each individual view may be scaled as required so that, for example, one view may be at 100% while another window shows the same document scaled to 20% so showing a live 'mini' view. This mechanism also allows two different parts of a document to be edited without the need to scroll between them. Impression can display its pages within the window as side-by-side left/right pages, and as vertically arranged pages in a more traditional word processor-like fashion. Not only does this present a far more WYSIWYG display but is also allows instant scrolling to any position in the document. There is no need to specifically turn over the page, thereby overcoming a limitation of traditional DTP systems. Since any window can be scaled to show a reduced view, this system also allows multiple page 'thumb-nail' views.

Spelling checker

Included with Impression is a 60,000 word spelling checker providing some of the most advanced spelling facilities. Check-as-you-type, multiple user dictionaries, ignore dictionary, crossword and anagram solving and an intelligent 'guess' feature are included. Other related dictionaries control automatic abbreviation expansion as you type, and a hyphenation exception dictionary provides precise hyphenation control over and above the normal automatic hyphenation.

This program is designed to help you tidy up or re-organize an ADFS disc. It makes it easy to rename and delete files and to move them around the directory structure, by creating new ones, making them into subdirectories of one another and so on.

In addition, it offers the option of compacting the disc fully after the work has been done on it.

Initializing

Type in the ADFS *Disc Manager* program from the yellow pages, save it and run it. Make sure the disc you want to deal with is in the drive, and then enter the disc drive number when prompted. You can enter any one of 0, 1, 4, 5, A, B, E, F. You will then have to wait for a few moments while the program scans the disc to find out what is on it.

This can take a little while for a disc with a complex directory structure. (Note that the program, as it is written, will not cope with directories nested to a depth of more than nine).

The program will then display the contents of the disc on the screen. It is possible that there will not be enough room on the screen for all the items to be displayed at once but it is easy enough to scroll through them.

The display

Most of the screen is taken up with the list of the items on the disc but there is also a small command window at the bottom of the screen.

In the main area the display is of a hierarchical nature, corresponding to the directory structure. Files appear in white and directories in green.

The contents of each directory are shown immediately below the directory name and are indented by two spaces more than the directory itself.

Within each directory, the files appear first, in alphabetical order, followed by the subdirectories (with their own contents). These subdirectories are displayed in reverse alphabetical order. This is simply a consequence of the way that the program scans the disc while initialising. It would be possible to reverse them and put them into true alphabetical order but it would require some more programming and seems to offer little advantage to justify this extra work.

The cursor takes the form of a blue bar on a file or directory. This can be moved through the items on the disc using the arrow keys. The up and down arrow keys work as you would expect.

The left arrow key moves the cursor from its present position to that item's parent directory. The right arrow key has no effect at all. The screen scrolls when the cursor approaches the top or bottom of the display.

It is also possible to display the attribute codes (as set by *ACCESS). The TAB key toggles these on and off. When on, they are shown at the extreme right-hand edge of the screen to avoid cluttering the main display.

There are some commands which work selectively (you can choose which items on the disc are affected by them). This selection is done by 'marking' the files or directories which you want to deal with. The item at the cursor can be marked or unmarked by pressing the COPY key.

Marked files and directories appear with a red bar. When the blue cursor coincides with a red mark (as it always will when an item is first marked) the bar is shown in purple. You cannot mark the root directory.

CONVERSION FOR ELECTRON

There are two problems which will appear if you try to use this program with the Electron, both caused by the lack of mode 7. These are memory shortage and screen display style.

The first of these is not terribly serious. You can try a combination of decreasing max% and stsz% (say, to 100 and 200), removing 'cosmetic' parts of the program such as the HELP facility and REMS and replacing PROCoscli with OSCLI throughout and removing the procedure definition. After this, there seems to be no difficulty in running the program in mode 6 with quite a bit of space left over.

The second problem is more fiddly to solve. The BBC version of the program relies on teletext control codes, especially to distinguish directories from files and to display the cursor and marked files. In mode 6 these will appear as odd characters to the left of the filenames. However, it is not difficult to change the program to show directories in reverse video, and to show the cursor and marks as user-defined characters. A user might like also to hide the *MAP output which is used when testing whether the disc is fully compacted. In the BBC version this is done with teletext control code 152.

Commands

Commands are entered from the keyboard. They may be entered in upper or lower case and most of them can be abbreviated (but don't add a full stop). In the following list, the shortest permissible abbreviation is shown in brackets.

When a command needs the cursor to be in a specific position or needs files to be marked, then this can be done at any time before pressing the RETURN key at the end of the command. When a command needs a filename, the program prompts for it.

DELETE (DE) – deletes the file or directory at the current cursor position. If the item is locked, the program first asks you to confirm that you are sure.

This command cannot be used to remove a non-empty directory.

WIPE (no abbreviation) – used to delete selected files from anywhere on the disc. To use it you first mark all the files to be removed (by moving the cursor to them and pressing the COPY key). Entering WIPE will then delete all these marked files. This command cannot be used to remove directories.

With this and the other commands that can potentially destroy a lot of files you must enter the command in full and also confirm the action.

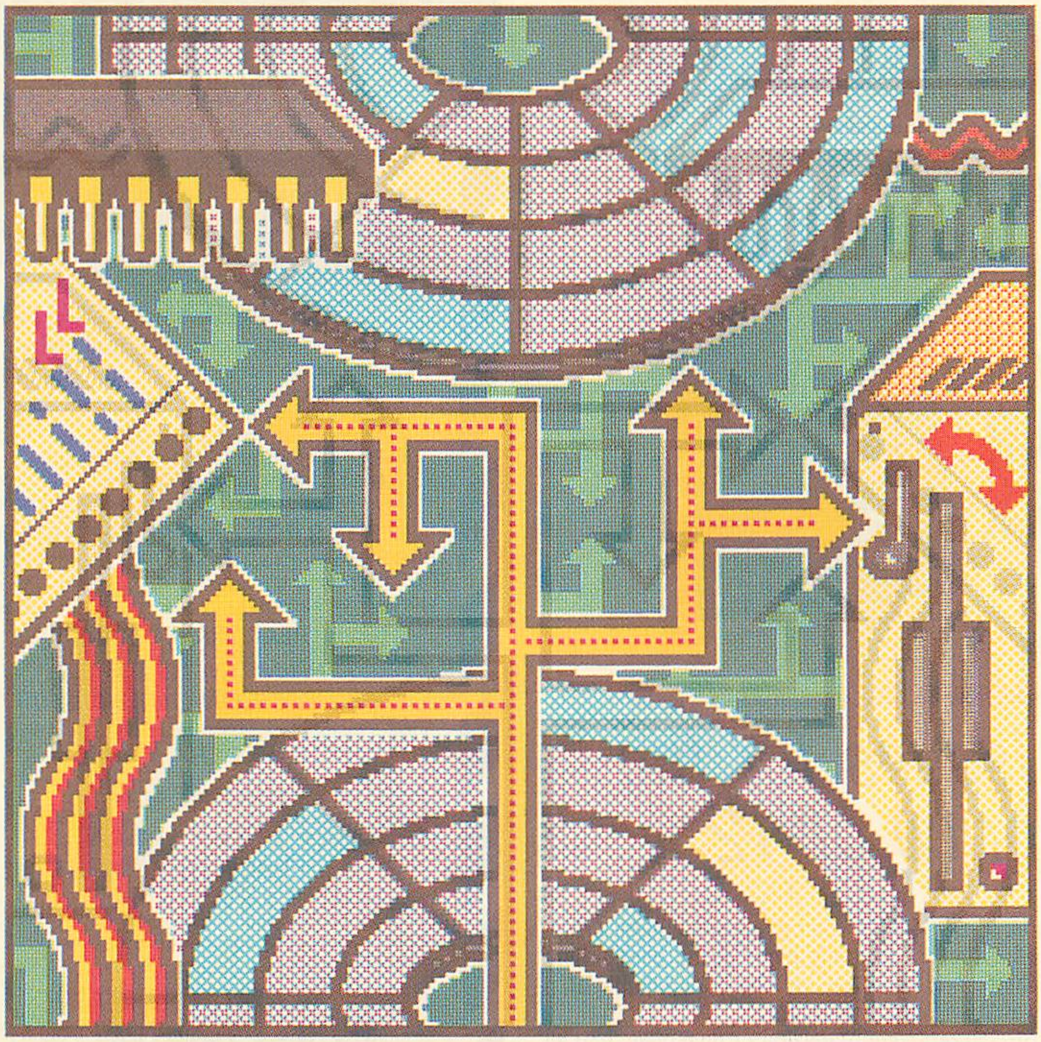
KILL (no abbreviation) – destroys a directory and all its contents. To use it you simply move the cursor onto the directory you want destroyed and type KILL. As with WIPE this command can result in large-scale deletion and so it has to be entered in full and confirmation given. The KILL command will not work with the root directory.

ANNIHILATE (no abbreviation) – destroys everything on the disc: files and directories. As its effects can be a bit drastic, it has to be typed in full. Since you usually have to think how to spell it, this is normally sufficient protection but as an extra precaution you are asked to confirm the command.

Note that if there is a lot on the disc, then ANNIHILATE can take a bit of time to operate and it is sometimes quicker simply to re-format the disc.

CDIR (CD) – creates a directory. Move the cursor to the directory that you wish to be the parent directory and then type CDIR. The program asks you for the name of the new directory.

MOVE (M) – moves files from one directory to another. Using it (along with CDIR and DIRMOVE) you can totally re-organize the structure of the disc. It can



NEW ORDER

Put your house in order with this easy to use front end for your advanced disc filing system

David Harper

be used to move as many files as you like into one specified directory.

First mark all the files you want to move, then place the cursor on the directory you want them to be transferred into and type MOVE.

This command will only affect files and cannot be used to move subdirectories around. Neither can it be used to move 'Execute only' files (files with the E attribute set. This is not a deliberate feature of the program. It is simply that the ADFS will not allow it to be done).

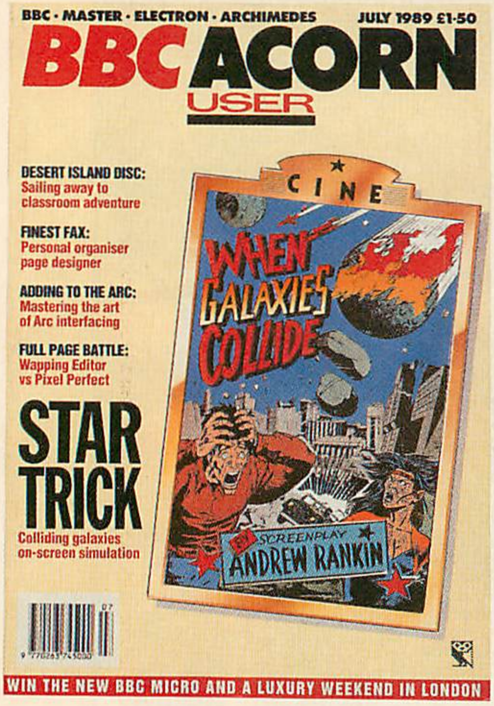
DIRMOVE (D) – moves a directory. It is used like the MOVE command but can only be used to move one directory at once because various checks have to be made, such as to ensure that a directory is not being moved to within itself.

To use DIRMOVE, you first mark the directory you want to be moved (just the directory itself, not the contents) and place the cursor at the new parent directory. Type DIRMOVE and the directory, along with all its contents, will be moved to the new position.

RENAME (R) – renames a file or directory. Move the cursor to the item you want to be renamed and enter the command. You are then prompted for the new name. You cannot RENAME 'Execute only' files, neither can you use it for moving files around the directory structure, since this would cause the program to lose track of where the file was. Use MOVE for this.

ACCESS (A) – used to change the attributes on any collection of files and/or directories. Mark the items to be affected and enter the command. You will then be

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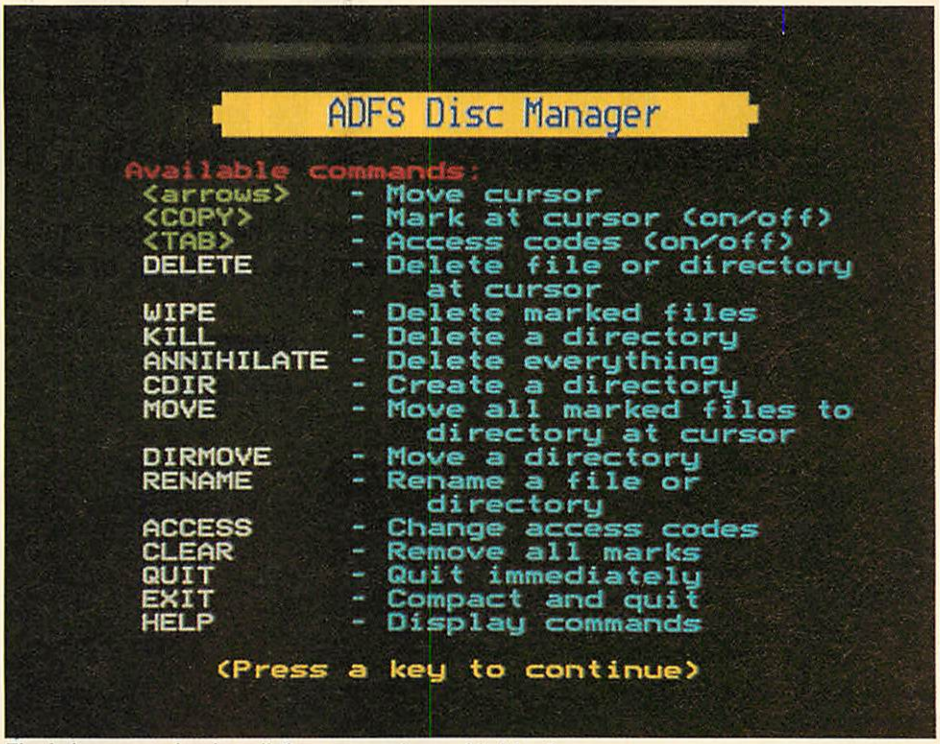
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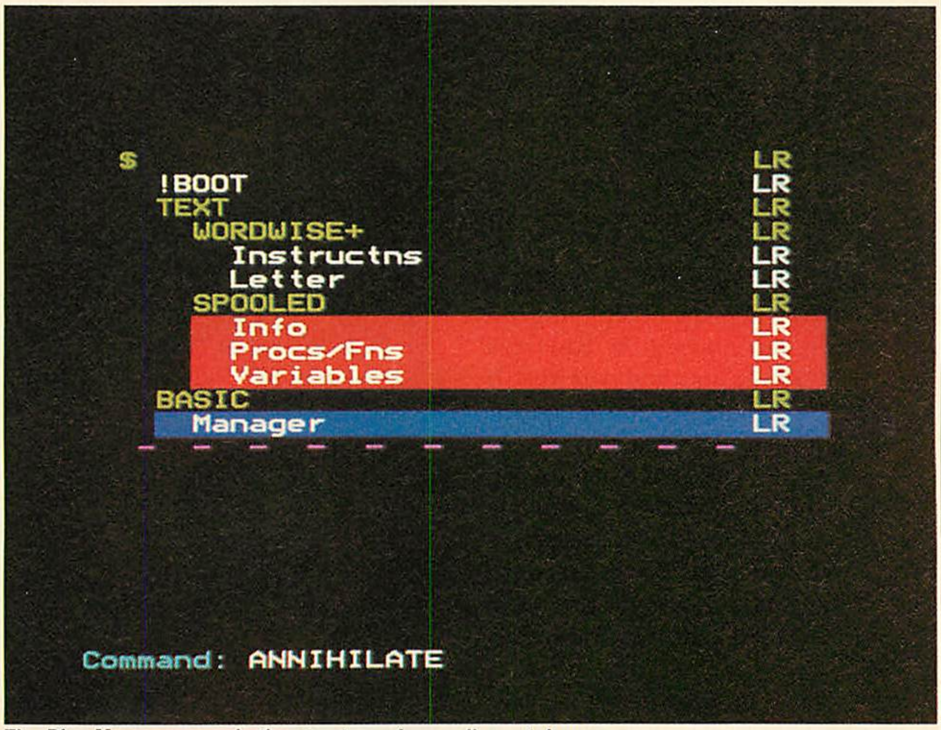
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The help screen showing all the commands provided by the program



The Disc Manager reveals the structure of your disc catalogues

asked for the new access codes. The display of the access codes associated with the items on the disc is switched on or off by pressing the TAB key.

CLEAR (C) – removes all marks. Note that they are cleared automatically anyway after a successful WIPE, MOVE, DIRMOVE or ACCESS command.

QUIT (Q) – leaves the program. You should use this (or EXIT) at the end of a session since ESCAPE is switched off. (This is done because otherwise it would be easy to abandon a command half-way through and then the details on the disc itself would not correspond with the copy in the memory).

Before finally leaving the program, the directory at the cursor (or its parent directory if the cursor is at a file) is first selected as the current directory.

EXIT (E) – This is like QUIT except that it first compacts the disc fully. Since compaction can take a bit of time, the program counts the compactions and displays which one is taking place. This is for the sake of reassuring the user (and alleviating boredom).

HELP (H) – gives a brief summary of the above commands.

The program

The program is written entirely in Basic. It was written using Basic 4 on a Master 128 but it works even with Basic 1. There is sufficient room for the program to run on a model B without shadow Ram and with Page set at around &1F00.

If you have Basic 2 or above, you can replace PROCoscli by OSCLI wherever it occurs and delete the procedure definition and all references to the variables cliblk% and clih%. This will give a little more memory space. You will have to reset the variables max% and stsz% to utilize this memory.

You will notice that there is an extensive use of indirection in the program but this is mainly to access four, quite large, byte arrays. These save space over integer arrays.

As it stands it will not work on an Electron, though I can offer a few suggestions as to how it might be converted. There is one point at which the display is not quite correct.

Files which, under ADFS, have the E attribute set may or may not have the L attribute set as well. However, there is a difficulty in reading whether this is so for a particular file. Normally attributes are read using OSFILE with A=5. If the E attribute is set, though, this call returns with &FF in the accumulator (indicating an 'Execute only' file) but no other information is given.

It is possible to tell whether the L flag is set in these circumstances by reading the attributes in a completely different way. The only legal command which distinguishes an EL file from a simple E file is *INFO (and *EX on the Master).

The information could be written to the screen this way and then read off it with OSBYTE &87. This could be done while initializing but it shouldn't be attempted at other times.

Alternatively, this procedure can be done by intercepting the WRCHV vector, issuing a *INFO command and then reading the flags from its output which has been written into memory rather than to the screen. As you might imagine, though, doing this led me to some very messy programming, so take care with this method.

LAB REPORT

The second in our series on languages looks at Pascal – in many ways the forerunner of BBC Basic

Neil Sykes

Last month we began this series on languages with Comal, a rather neglected language which we found offered a number of extra commands and structures over Basic to make programs more elegant and readable. This month, we look at one of the most popular computer languages after Basic–Pascal.

Pascal, and its predecessor Algol are much used in scientific applications and were the inspiration for languages such as BBC Basic and Comal. Many of the 'structuring' features, talked about last month, such as WHILE, REPEAT, CASE, were originally used in Pascal.

However, Pascal has many other strings to its bow, which could not easily be added on to Basic.

The first thing you notice about Pascal is the number of steps needed to get a program up and running. In Basic you just type in all the lines and type RUN. If anything goes wrong, you just retype the offending line and RUN again.

Pascal does not have this immediacy. To begin with, you type the program into a text editor – possibly a wordprocessor – to produce an Ascii file, usually called the source code. You then compile this file to produce the object code which can then be run.

If an error occurs anywhere, the whole process has to be started again. Because of this, you need to keep two files for each program you write. This way of working will be familiar to those who use the Basic assembler, where RUN assembles the code, which you then need to CALL, or *SAVE and *RUN.

This makes trial-and-error development difficult in Pascal. With large programs, though, this is no bad thing. Programs written this way usually need lots of trials and produce lots of errors! The discipline imposed by Pascal, and many other compiled languages we will be looking at, will make you a better programmer.

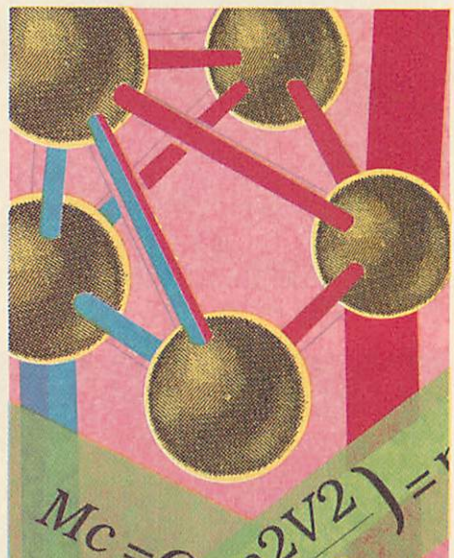


ILLUSTRATION BY ANDREW LOVELL

Let's begin with a simple program to print all the letters of the alphabet. In Basic you have:

```
10 FOR X%=ASC"A" TO ASC"Z"
20   PRINT CHR$X%;
30 NEXT X%
```

Translating this into Pascal gives you:

```
program letters(output);

var
   c : char;

begin
   for c := 'A' to 'Z' do
          write(c);
end.
```

Even a simple program such as this brings out several differences between Pascal and Basic. The most significant of these is the declaration of the variable c, along with its type (char – for character).

In Basic, if you want to use a variable, you just give it a value – X=4. The type of variable is implied by the ending of the name – X$ is a string, X% is an integer.

When you start writing Pascal programs you will often forget declarations and be greeted with an error everywhere the variable occurs. Eventually you will get into the habit of declaring variables and it is actually good practice to think about what variables you will use before writing a program.

Variables of type integer, real (floating point), char (single character) and Boolean (true or false) are available automatically. What sets Pascal apart from Basic is that you can define your own types of variable. For example:

```
    type
model = (Fiesta, Escort, Orion,
Sierra, Granada);
```

This is the simplest definition of a variable type, in this case model, called an enumerated type. Any variable can now be declared to be of this type. Such a variable can only have the values listed. You cannot say:

```
mycar := 5;
```

or:

```
mycar := yourcar + 1;
```

but you can move forwards or backwards through the list of values with SUCC and PRED. Assuming the order of model above,

SUCC(Orion) is Sierra and PRED(Escort) is Fiesta. These types can also be used in FOR loops, as can characters. In the sample program you had:

```
for c := 'A' to 'Z' do
```

In Basic you can only use FOR with numbers, so you had to write:

```
FOR X%= ASC"A" TO ASC"Z"
```

In other words, you use ASC to translate from characters to numbers, only to use CHR$ in the next line to translate the whole thing back again.

This highlights one of the major problems of Basic and it is an area where Pascal has considerable advantages. Basic constrains all data to become numbers or strings and is very good at handling these. When the data you are using doesn't fit into these categories, clumsy programming is required.

Sometimes, data is more complicated than you have seen so far. You may be familiar with the structure of databases, such as *Viewstore*, where the information is held as records which have a number of fields within them. Pascal has facilities for handling such data. For example, you could expand your definition of the model type to include other details:

```
type
  car =
        record
    name : model;
    cc : integer;
          InsGp : 0 .. 9;
  end;
```

Note that InsGp has been declared as what is called a subrange type. You could have made it an integer but giving the limits in advance means the car cannot, say, accidentally be put into insurance group 329, generating a correspondingly large premium for the unfortunate owner!

This new type of variable can be manipulated as a single unit, which makes the writing of databases much easier than in Basic, where you would have to keep track of individual fields.

Sometimes, of course, you will need to access these fields, which you can do with the notation:

```
if yourcar.cc < 1000 then
yourcar.InsGp :=
1;
```

This can be written more neatly:

```
with yourcar do
  if cc < 1000 then InsGp := 1;
```

Another data structure which Pascal supports is the linked list.

Suppose you were writing a program in Basic to keep track of the cars in for repair in a garage. You might decide to hold the details in a number of arrays. How big should an array be? If you allowed for, say, 20 jobs you would be in trouble if there was a cold snap and a shortage of mechanics.

You could get around this by allocating enough space for 200 jobs but this space would be wasted and you could run out of memory.

A linked list is a structure where each element contains a pointer to the next one. Because the pointers can point anywhere in memory, the space for the data does not have to be set aside before the program is run and when space is not needed it can be freed for use by other data.

Pascal has special types of variables, called pointers, which make the programming of linked lists easier.

Pascal also has its disadvantages. In particular, the user-defined variable types we have looked at can only be read from or written to machine-readable files, not to the screen or printer or to text files. For example:

```
write(yourcar.name);
```

will not produce something like Fiesta. It will give an error. To print these types you will have to write something like:

```
procedure WriteName(c : car);
begin
  with c do
    case name of
      Fiesta : write('Fiesta');
      Escort : write('Escort');
```

and so on. This necessary translation of internal names into printable strings brings us to the weakest point of Pascal – string handling. Pascal has very few facilities for handling strings. You can declare a type:

```
String = packed array[1..50]
of char;
```

but if you have a variable s of this type then:

```
s := 'Hello'
```

will not work because the string you assign must have 50 characters also. This produces very untidy code.

If you assign a string, you can write but not read from the keyboard – you must write another procedure to do this. The main advantages of Pascal are its ability to fit in well with the structure of your data, and that it is portable between computers.

If these factors are important to you, and you can live with its limitations, Pascal is an excellent tool to have at your disposal.

GETTING INTO PASCAL

Acorn's ISO-standard Pascal costs £51 as two 16K Roms for the model B or on cartridge for the Master or Electron. There is also a version for the Archimedes at £95.

A Master 512 owner has access to a number of very high-quality (and appropriately priced) compilers designed for the PC market. Many of these packages provide the string facilities missing from standard Pascal. One of the best-known of these is Turbo Pascal by Borland. This is also comparable in price to the Acorn compiler, whereas some PC packages are in the £200 bracket.

The Acorn ISO Pascal conforms to the ISO standard, and has some extensions, such as VDU and ADVAL to give access to the BBC's hardware. It also supports calls to external machine-code routines.

The manual supplied explains in detail how this can be done, and also gives a full guide to the editor supplied with the system which Master users will recognise as an earlier form of *Edit*.

Another excellent book is supplied with the compiler – *Pascal from Basic* by P J Brown. This book is one of the best text books on Pascal I have seen. It is written in a light and often humorous style but still covers every aspect of the language very well indeed.

ISO Pascal does not produce 6502 machine code but instead compiles to an intermediate code which is interpreted by one of the Roms when the program is run.

This means only computers fitted with the Pascal Rom will be able to run your programs. However, Acorn also produces a Stand-Alone Generator on disc which will convert your compiled programs to run on any machine, giving you an option of disc or sideways Ram format. This costs an extra £30.

REPORT RETORT

The new subject of Design and Technology is ready to make an impact in our schools. How will IT fit into the scheme of things?

Chris Drage and Nick Evans

This article will be of interest to parents and teachers alike since it directly affects them both. Parents will want to be aware of the new curriculum being designed for their children by government agencies and teachers will want to know what it is that they are going to have to teach.

The recent report by the working group on Design and Technology has given food for thought to all levels of school education since its proposals are wide ranging and have broad implications for many other subject areas.

It is true to say that the implication of these proposals would revolutionise the educational process.

Here, we shall take a look at the information technology element of the report and see how its impact will be felt by pupils, teachers and industry.

The report is unique in the National Curriculum discussion process since it proposes a whole new subject area – Design and Technology. This subject should not be confused with Craft Design Technology (CDT) which has now become but a part of the broader subject discipline. Design and Technology embraces the former subjects of CDT, Home Economics, Business Studies and Computer Studies, three of which were already relative newcomers to the secondary school arena only a few years ago.

The interesting, and tricky, part of this new subject is that the former subjects from which it is composed will continue to operate, but as aspects of the whole subject. So, a CDT teacher may be involved in processes which overlap into the areas of Home Economics or Business Studies and similarly for his or her colleagues. There will be a high level of retraining required as well as the need for support across those subject boundaries.

The whole report places emphasis on the importance of projects or standard assessment tasks which incorporate a broad understanding of the implications of any or all of the disciplines for the project. A pupil may decide to design a solution to a problem such as the creation of an effective flip-top dustbin. In that project there will be design, planning, costing, evaluation, use of technology and materials, creation and marketing of the finished project. Where relevant, information technology will play its part.

The information technology aspect is in many ways more intriguing than the actual Design and Technology subject



Pupils will need to use their IT skills

area since it too is unique in that its brief crosses all subject areas within the school. The assessment of information technology skills will take place in those subject areas where the technology is being used appropriately and as part of other National Curriculum core subjects.

A child's understanding of the use of, say, databases may be evaluated through their work in history, geography, science or wherever. The main implication of this is that there will be a significant load on the information technology co-ordinator in the school. In the first place, few teachers have the necessary IT skills to be able to implement the requirements of the report. Therefore the IT co-ordinator will have a heavy load of in-service training to undertake.

Even assuming a basic familiarity with tools such as databases, spreadsheets and the like, few teachers actually possess the detailed information skills necessary for the assessment of pupil performance in creating relevant projects 'to design, develop, explore and evaluate appropriate models of real or imaginary situations'.

For example, at Key Stage 4, towards the latter end of the child's school career, he or she is asked to 'analyse real systems which are to be modelled using IT, to make appropriate choices in designing, implementing and testing the model and to justify the methods they have used'.

Bearing in mind that this involves a detailed use of IT at a level normally used in industry and business, this represents a significant sophistication compared with previous tasks required under computer studies for instance.

The main difference between this type of task and computer studies is that the task is developed in a context which has a real meaning. Computer case studies that examine the real world through the end of a simulation rarely either inspire the user or actually recreate the context in which the computer tools are used.

With regard to the National Curriculum, however, the applications are used in a context of the pupil's own designing. In order to achieve their ends they are choosing appropriate tools and exploiting them. This naturally has a significant impact on the level of computer facilities necessary for the implementation of this policy and also on the management of those facilities.

Who is to undertake the training, the management, indeed the general overseeing of the whole IT operation across the

relevant curriculum areas as well as in the Design and Technology areas? Yes, the IT co-ordinator: 'we envisage that in each school there will be a teacher responsible for the overall co-ordination of IT in the school and he or she will have an important role to play in moderation arrangements between schools'.

So what about the actual IT components of the Design and Technology report? What is actually required? First, it should be understood there are two separate IT facets to the report. The first is the appropriate use of IT in Design and Technology itself and the second is the teaching of IT skills and their evaluation in other areas of the curriculum.

Within Design and Technology, pupils will be required to use IT skills and tools that will help them in the solution of design, planning and implementation problems in their standard assessment tasks as well as in their day to day curricular work. A pupil may find that in the course of any single project he or she will use a project planner to schedule the work, databases to research aspects of the design, spreadsheets for costings and financial viability, graphic design tools for creation and modification of a design and computer controlled devices such as CNC lathes and so on for the machining of the end product.

Control technology figures large in this arena as well, with younger pupils at Attainment Level 3 (age 10–11) 'controlling a robot device or arrowhead on screen', building up through programmable robots at Level 4 to the concept of feedback, inputs and outputs and stability at Level 5 (11–12).

The essence of this first level of use of IT is that it is specifically a part of the Design and Technology process as specified in the report. The child uses the tools to achieve the objectives set by the standard attainment tasks whereas the separate and discrete IT component of the report is specifying the skills to be examined without necessarily providing a context. That is provided by the subject area in which the skill is developed and evaluated.

In that context, a child will be expected to master a wide range of IT skills and, since this is now a core subject of the National Curriculum, it is further expected that children will be evaluated in their IT and D&T skills at age 16.

This more generalised component deals with information handling generally in all its forms. Therefore they will experience the use of databases and word-processors, number crunching in the form of spreadsheet and similar applications, graphic handling, music creation and editing, simple programming, computer aided design and modelling, building up to the ability to use a combination of IT tools and resources appropriately in order to achieve a specific objective.


Design and Technology should foster awareness in design and manufacturing

In and among that process however, they will also be required to learn to be discriminating in the selection and processing of data – creating questionnaires that are not biased towards the required answers, creating information structures that meet the needs of the end users and processing information in an efficient and effective manner.

How many, even of those reading this article, possess sufficient skills to tackle all that now? Yet it is realistic to assume that the generations of school children passing through the system will be highly IT aware even before this system gets under way? The main problem is the staff, not the pupils!

Despite press agitation, particularly in *The Times Educational Supplement* when the original report was released, there is little for schools to be anxious about in terms of cut-backs on present IT practice. On the contrary, they should be worried about whether they have sufficient resources and skilled staff to implement all of the report's suggestions.

It is certain the broad thrust of the report is designed to build a nation of entrepreneurs. The entire design and manufacturing process is rehearsed in a school context and the opportunities for business simulation or I suspect, actual implementation in some adventurous schools will be extensive. Not only the viability of a product at its design stage must be considered but also the market appeal and likely buying trends have to be taken into account.

The idea of school enterprises, raising funds and producing goods may be anathema to some yet there is little doubt that an awareness of the need for quality in design and manufacturing, a pride in one's own work and its worth are well worth fostering.

The problem of integrating the previously discrete subject areas that comprise this new subject area will, in a few years, disappear into the mists just as did the horrors of raising the school leaving age, introduction of computer studies and the implementation of GCSE, CPVE and all the other schemes that come upon the teaching community.

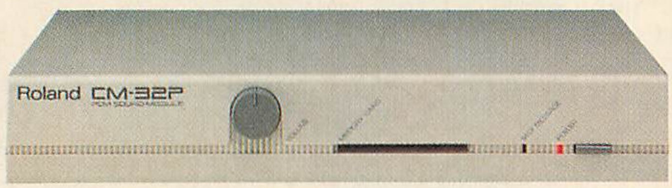
The Design and Technology Committee's recommendations to the Secretary of State are available from Her Majesty's Stationery Office, PO Box 276, London SW8 5DT. Tel: 01-873 9090.

COMPETITION

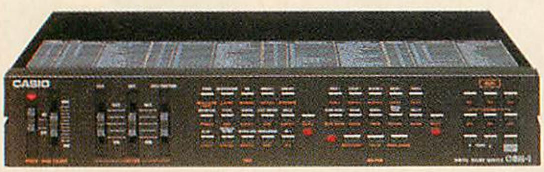
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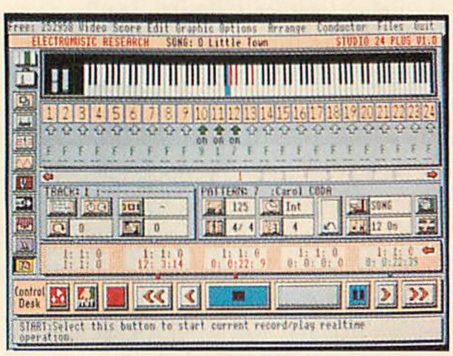


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Winners with an Archimedes will receive an Acorn AKA16 Midi interface podule providing one MIDI in, two MIDI out and a MIDI thru. Arc winners will also receive a copy of EMR's Studio 24 Plus program (worth £99).



There are also runners up prizes of 10 EMR Symphony discs – an instant introduction to Archimedes music (worth £10 each) – and 10 *MIDI, Micros and Music* books from EMR (also worth £10 each).

The Competition

To win one of these mouth-watering prizes, all you have to do is to answer the 10 simple questions on the right. The first three correct entries out of the editorial hat after the closing date will be the winners of the three prizes.

Study each question and when you think you've got all the answers, write the answer for each next to the question number on the back of a postcard or sealed envelope.

Put your name and address clearly on the card or envelope along with your choice of a Beeb or an Arc system and send your entry to:

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Entries must be in the eager arms of the BAU post room by Friday October 27th.

The competition is not open to employees of Redwood Publishing, Acorn, EMR, Roland or Casio, nor their families. The judges' decision on all matters concerning this competition is final.

1 Which famous classical composer was deaf?

2 Name the five notes represented by the five lines of a treble stave

3 How many strings does a Spanish guitar have?

4 Who founded the promenade concerts?

5 Name the inventor of the electric guitar

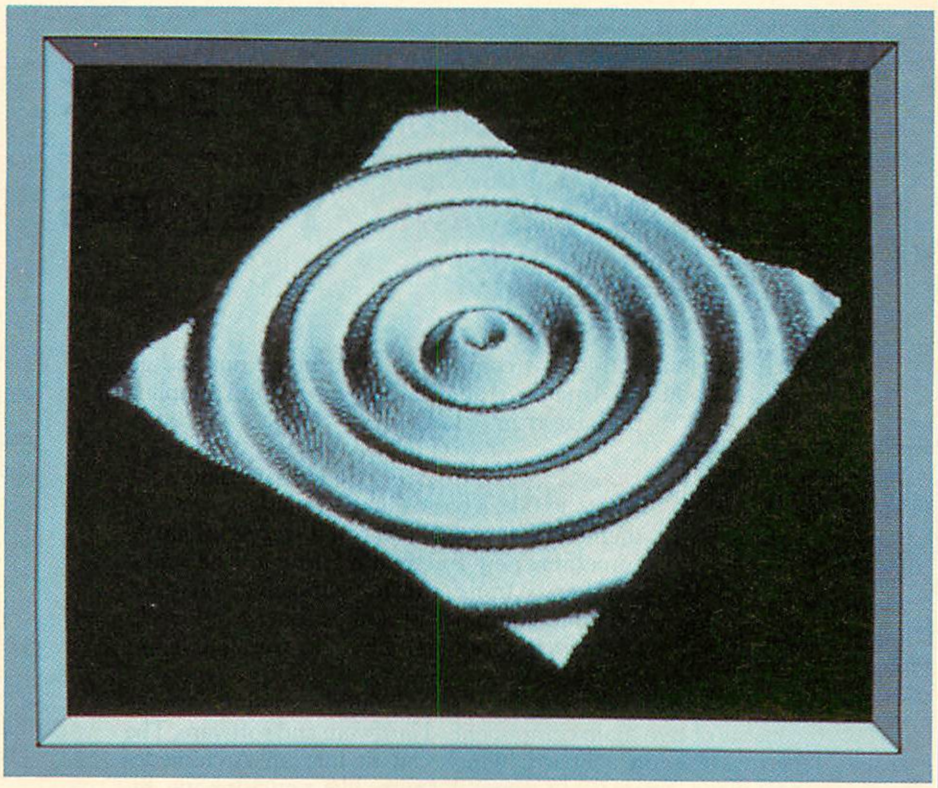
6 What does MIDI stand for?

7 When was the MIDI standard first published?

8 Name the pop star who uses a BBC Micro to control his MIDI system, featured in the June issue of BAU

9 How many semitones are there in an octave?

10 By what name is ex-computer programmer Declan McManus better known?



RIPPLE

Michael Attenborough goes out to sea with a program for your Arc. But watch out, it'll cause waves

This is a program which generates a sequence of 3D views of a rippled surface of a silver liquid, then animates them, making the ripples spread outwards continuously. The surface is shaded to simulate being lit by a parallel beam light source, resulting in a very realistic picture.

Any number of waves of different amplitudes and phases can be placed anywhere on the surfaces, and they will interact and cause interference patterns.

So, this program could be of use in teaching simple wave properties, such as standing waves, interference, principle of superposition, nodal lines and so forth.

Using the program

To achieve a smooth animated sequence, about 20 large sprites are needed, so the program needs a lot of space. On a 1Mb machine this can be achieved by configuring ScreenSize to 40K, and SpriteSize, FontSize and RamFsSize to 0. SpriteSize can be 0 because the program stores the sprites in its own area.

Smaller numbers of sprites are possible and a reasonable effect is still possible with only 10. More frames could be drawn on a 2 or 4Mb machine or the program could be run in mode 12 or 20.

If you do this, you will need to change both occurences of 32044 to 32944*2 or 32944*4 for modes 12 and 20 respectively.

When you run the program, it first asks if you want to load previously drawn sprites from disk. If you do not, the program then prompts for a number of squares per side. This adjusts the quality of the picture. With 160 squares on a side, the individual squares are not visible and the surface is very smooth but each picture takes a very long time to draw. With 40 × 40 squares, each picture is drawn very quickly and this is useful for checking the placing of waves before doing a 'final copy'.

The program next tells you the maximum number of frames and asks how many you want. For a still picture, enter 1.

The pictures are then drawn one at a time. An hourglass tells you what percentage of the drawing has been completed. Once drawn, there is an option to save the sprites to disc before viewing them.

The wave sources and their attributes are defined by FNz. Several definitions of FNz are included, so you can put REMS in front of all except the one you want.

Alternatively you can enter your own set of wave sources in the same way. For each source an FNwave is needed. The first two parameters must be X, Y. The next two are the coordinates of the centre of the wave source.

The visible surface has X and Y coordinates from −600 to 600 but the centre does not have to be inside this area, for example when it is acting as an image point meaning the ripples start out of sight. The first two parameters in the program are the phase in degrees and the amplitude.

The viscosity of the liquid and the wavelength of the waves are defined in PROCinit2. The incident angle of the lighting is defined in PROC3Dinit. Array elements I(0), I(1) and I(2) are the Z, Y and X components respectively of the light direction.

Drawing pictures

The 3D algorithm is based on matrices, which the Archimedes can multiply in a single Basic instruction – a unique aspect of the Basic. The mathematical formulae for this came from the December 1987 edition of *Byte*.

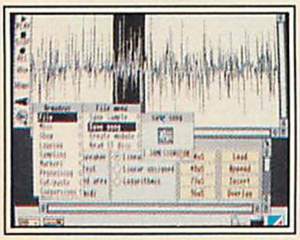
The 3D coordinates are multiplied by matrices to rotate them around the Z and then the Y axis. Perspective is then applied before the X and Y coordinates are used to determine the position of the point on the screen.

The shading algorithm also uses whole array manipulation, using 1 by 3 arrays as column vectors to find a normal to the plane, then the cosine of the angle between this normal and the light vector which is proportional to the amount of light on the surface.

CLARES

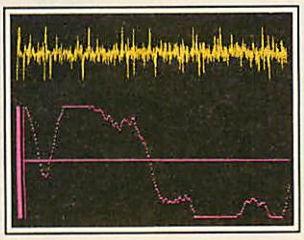
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Here's a chance to let the composer in you break out and go wild. Introducing *Armadeus*, an incredible new sound sampling package from Clares.



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How does it work? A sound sampling package consists of two main components. Hardware and software. The hardware is on a board, which can fit into an Archimedes backplane. There we fit external devices like a microphone, hi-fi or a CD player which allows input. The sound is then simply imported into the computer, and that's all there is to it.



What is sound sampling useful for? There are many varied uses. Sound sampling is professionally used in recording studios. Analysing musical characters and pieces, allowing various parts to be recognised and changed. And more commonly, it's used for fun, creating wild and whacky noises, or sound tracks for home videos and computer programs.

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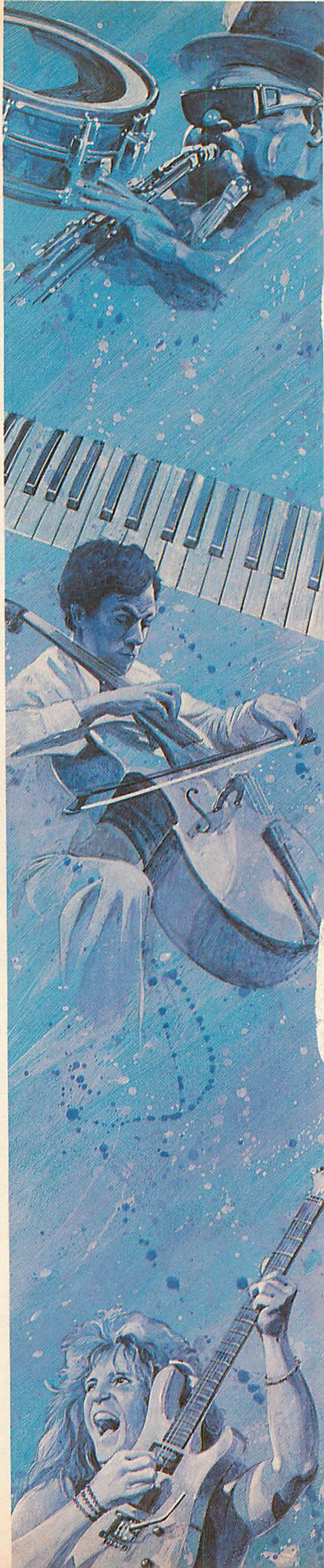
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ARCCOMM





Taking full advantage of the Risc OS, *ArcComm* is a unique new communications package for the Archimedes.

ArcComm's comprehensive design boasts access to all three European viewdata standards, (Prestel, Teletel and Bildschirmtext), together with ANSI colour, VT52 and VT102 scrolling terminals. Both Prestel and Bildschirmtext support Vasscom error correction, and the VT102 terminal offers 132 columns, and smooth scrolling. Full coverage of international character sets is included.

The package has been produced with ease of use as a priority. All screen displays are clear and uncluttered, with pop-up menus and dialogue boxes making control as simple as possible.

You won't have to remember strings of numbers! Its telephone number list allows you to dial and log-on automatically. You can store viewdata frames while on line, edit and upload mailboxes, and load/save frames or screens onto disc.

While communicating, it makes use of the full screen, rather than running in a desktop window. But you can return to the desktop at any time, and *ArcComm* remains running as an icon on the icon bar. You can use other desktop software while *ArcComm* stays on-line but inactive. And clicking on the icon brings back full-screen communication.

You can automate the log-on sequence for any comms service, by using *ArcComm*'s own procedure language. This allows you to log-on, set up the correct terminal emulation and all your preferences through a single menu selection.

ArcComm supports Hayes, DTI and manual modems, with details of how to write drivers for other modems in the User Guide provided. You will need Risc OS to use the package, and 1 Mbyte or more of memory. The package costs £29.95.

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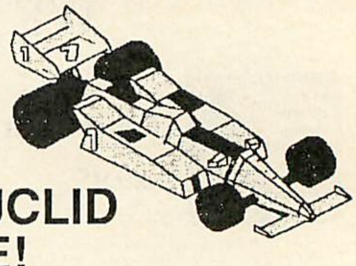
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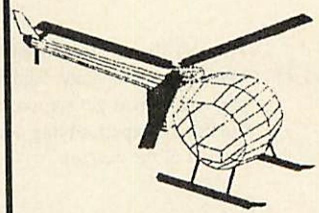
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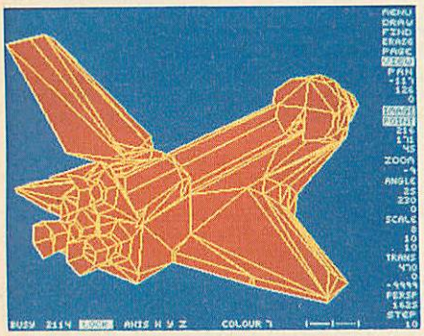
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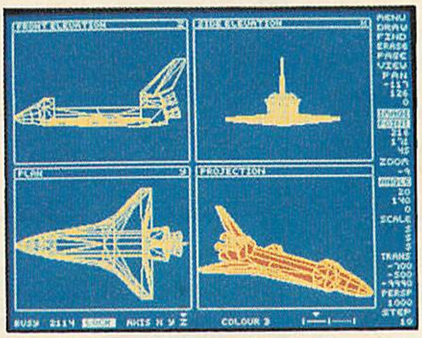
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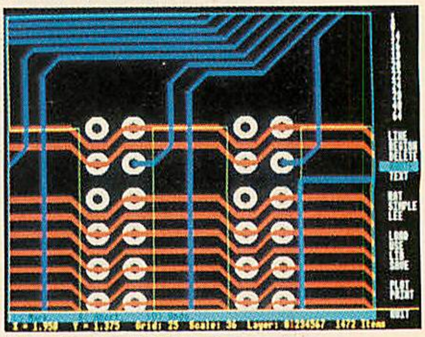
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YELLOW PAGES

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly T/D
Hints & Tips	34											
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Listings 2–3		■	■					■	■	■	■	■
Listings 4–5		■	■	■	■	■	■	■	■	■	■	■
Listing 6(1)		■	■	■	■	■		■	■	■	■	■
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Listings 1–4							■		■	■	■	■
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Notes. 1. Requires ADFS 2. Requires RISC OS.

HINTS & TIPS

See Hints & Tips, page 33

Listing 1. Menus

```
   10 REM Menu Program
   20 REM For B/B+/M/C/E
 with DFS
   30 REM by Carl Batema
n
   40 REM (c) BAU Oct 89
   50 :
   60 rtlim=21
   70 top=3
   80 lftlim=1
   90 bottom=22
  100 :
  110 osbyte=&FFF4
  120 oswrch=&FFEE
  130 osrdch=&FFE0
  140 oscli=&FFF7
  150 :
  160 FOR opt%=0 TO 3 ST
EP3
  170 P%=&900
  180 [OPT opt%
  190 .code
  200 LDA #12
  210 JSR oswrch
  220 LDX #cat MOD &100
  230 LDY #cat DIV &100
  240 JSR oscli
  250 .start
  260 :
  270 JSR show
  280 .getch
  290 JSR osrdch
  300 BCC noerror
  310 RTS
  320 .noerror
  330 ORA #32
  340 STA ch
  350 LDX #0
  360 .find
  370 LDA keys,X
  380 BEQ getch
  390 CMP ch
  400 BEQ found
  410 INX:INX
  420 BNE find
  430 :
  440 .found
  450 CPX #12
  460 BCS donthide
  470 LDA #ASC " "
  480 JSR ptab
  490 .donthide
  500 LDA keys+1,X
  510 STA offset
  520 JMP (offset)
  530 :
  540 .up
  550 LDX cy
  560 DEX
  570 CPX #top
  580 BPL notoffX
  590 :
  600 .down
  610 LDX cy
  620 INX
  630 CPX #bottom
  640 .notoffX
  650 BEQ start
  660 STX cy
  670 BNE start
  680 :
  690 .left
  700 LDA cx
  710 CMP #lftlim
  720 BEQ start
  730 BCC start
  740 SEC
  750 SBC #20
  760 BPL notoffY
  770 :
  780 .right
  790 LDA cx
  800 CMP #rtlim
  810 BCS start
  820 CLC
  830 ADC #20
  840 .notoffY
  850 STA cx
  860 BPL start
  870 :
  880 .findfirstch
  890 JSR readch
  900 CPX #ASC" "
  910 BNE wrload
  920 JSR cursrt
  930 JSR cursrt
  940 :
  950 .wrload
  960 LDX #6
  970 STX count
  980 .nxtch
  990 LDX count
 1000 LDY ld,X
 1010 JSR wrch
 1020 DEC count
 1030 BPL nxtch
 1040 :
 1050 .wrfile
 1060 JSR readch
 1070 CPX #ASC" "
 1080 BEQ finish
 1090 TXA
 1100 TAY
 1110 JSR wrch
 1120 JSR cursrt
 1130 BPL wrfile
 1140 :
 1150 .finish
 1160 LDY #ASC""""
 1170 JSR wrch
 1180 LDY #13
 1190 JSR wrch
 1200 RTS
 1210 :
 1220 .show
 1230 LDA #ASC"}"
 1240 .ptab
 1250 STA pt
 1260 LDY #3
 1270 .nxttab
 1280 LDA tab,Y
 1290 JSR oswrch
 1300 DEY
 1310 BPL nxttab
 1320 RTS
 1330 .newdr
 1340 LDX #drive MOD &10
0
 1350 LDY #drive DIV &10
0
 1360 JSR oscli
 1370 JMP code
 1380 :
 1390 .cursrt
 1400 LDA #9
 1410 JMP oswrch
 1420 :
 1430 .readch
 1440 LDA #135
 1450 JMP osbyte
 1460 :
 1470 .wrch
 1480 LDA #138
 1490 LDX #0
 1500 JMP osbyte
 1510 :
 1520 .offset
 1530 EQUB 0
 1540 EQUB P% DIV &100
 1550 .keys
 1560 EQUS ":"
 1570 EQUB up
 1580 EQUS "/"
 1590 EQUB down
 1600 EQUS "z"
 1610 EQUB left
 1620 EQUS "x"
 1630 EQUB right
 1640 EQUS "1"
 1650 EQUB findfirstch
 1660 EQUS "0"
 1670 EQUB newdr
 1680 EQUS "2"
 1690 EQUB newdr
 1700 BRK
 1710 :
 1720 .drive
 1730 EQUS "DR."
 1740 .ch:BRK
 1750 EQUB 13
 1760 .count:BRK
 1770 .tab
 1780 .pt:EQUS "}"
 1790 .cy:EQUB 4
 1800 .cx:EQUB 1
 1810 EQUB 31
 1820 .cat
 1830 EQUS "."
 1840 EQUB 13
 1850 .ld
 1860 EQUS """ DAOL"
 1870 ]
 1880 NEXT
 1890 :
 1900 *SAVE M 900+FF
 1910 CALL code
```

Listing 2. Shrink source code

```
   10 REM Picture Shrink
 (M/C)
   20 REM for B/B+ only
   30 REM by Andrew Benn
ett
   40 REM (c) BAU Oct 89
   50 :
   60 IF PAGE < &1900 TH
EN PRINT "Set PAGE to &1
900 and CHAIN again" : E
ND
   70 PROCassemble(FALSE
)
   80 PROCchecksum
   90 A$="SAVE LPIC 1100
 "+STR$~O%+" 2800 2800"
  100 PRINT A$
  110 PRINT"Press any ke
y to save ... "
  120 IF GET
  130 X%=0
  140 Y%=7
  150 $&700=A$
  160 CALL &FFF7
  170 END
  180 :
  190 DEFPROCassemble(op
t)
```

Continued ▶

◀ Hints & Tips, listing 2 continued

```
  200 IF opt THEN set=7
ELSE set=6
  210 FOR I=4 TO set STE
P set-4
  220 P%=&2800
  230 O%=&1100
  240 w2=&70
  250 ST2=&72
  260 [OPT I
  270 .shrink
  280 LDA &355
  290 CMP #3
  300 BCC okmode
  310 BEQ badmode
  320 CMP #6
  330 BCC okmode
  340 .badmode
  350 BRK
  360 EQUB 154
  370 EQUS "Bad mode"
  380 BRK
  390 .okmode
  400 LDY #0
  410 LDA #1
  420 LDX #&70
  430 JSR &FFDA
  440 LDA #&40
  450 LDX &70
  460 LDY &71
  470 JSR &FFCE
  480 STA handle
  490 CMP #0
  500 BNE okhandle
  510 BRK
  520 EQUB 153
  530 EQUS "No picture"
  540 BRK
  550 .okhandle
  560 SEC
  570 LDA &304
  580 SBC &300
  590 STA xs
  600 LDA &305
  610 SBC &301
  620 STA xs+1
  630 SEC
  640 LDA &306
  650 SBC &302
  660 STA ys
  670 LDA &307
  680 SBC &303
  690 STA ys+1
  700 CLC
  710 LDA xs
  720 ADC #1
  730 STA xs
  740 LDA xs+1
  750 ADC #0
  760 STA xs+1
  770 CLC
  780 LDA ys
  790 ADC #1
  800 STA ys
  810 LDA ys+1
  820 ADC #0
  830 STA ys+1
  840 LDA &300
  850 STA &70
  860 LDA &301
  870 STA &71
  880 LDA &306
  890 STA &72
  900 JSR address
  910 LDA &70
  920 STA W
  930 LDA &71
  940 STA W+1
  950 LDA &72
  960 STA wpib
  970 LDA &362
  980 LDX wpib
  990 BEQ nord
 1000 .rloop LSR A
 1010 DEX
 1020 BNE rloop
 1030 .nord STA wps
 1040 LDA #data MOD 256
 1050 STA ST
 1060 LDA #data DIV 256
 1070 STA ST+1
 1080 LDA &352
 1090 STA temp+1
 1100 LDA &353
 1110 STA temp+2
 1120 LSR temp+2
 1130 ROR temp+1
 1140 LSR temp+2
 1150 ROR temp+1
 1160 LSR temp+2
 1170 ROR temp+1
 1180 LDX &361
 1190 STX temp
 1200 .rloop2 ASL temp+1
 1210 ROL temp+2
 1220 LSR temp
 1230 BNE rloop2
 1240 LDA #0
 1250 STA temp
 1260 STA temp1+2
 1270 LDA xs
 1280 STA temp1
 1290 LDA xs+1
 1300 STA temp1+1
 1310 JSR div
 1320 LDA temp
 1330 STA stx
 1340 LDA temp+1
 1350 STA stx+1
 1360 LDA temp+2
 1370 STA stx+2
 1380 LDA #0
 1390 STA temp
 1400 STA temp+1
 1410 STA temp1+2
 1420 LDA #1
 1430 STA temp+2
 1440 LDA ys
 1450 STA temp1
 1460 LDA ys+1
 1470 STA temp1+1
 1480 JSR div
 1490 LDA temp
 1500 STA sty
 1510 LDA temp+1
 1520 STA sty+1
 1530 LDA temp+2
 1540 STA sty+2
 1550 LDA #0
 1560 STA styo
 1570 LDA handle
 1580 STA &70
 1590 LDA #data MOD 256
 1600 STA &71
 1610 LDA #data DIV 256
 1620 STA &72
 1630 LDA #0
 1640 STA &73
 1650 STA &74
 1660 STA &77
 1670 STA &78
 1680 STA &79
 1690 STA &7A
 1700 STA &7B
 1710 STA &7C
 1720 LDA &352
 1730 STA &75
 1740 LDA &353
 1750 STA &76
 1760 LDX #&70
 1770 LDY #0
 1780 LDA #4
 1790 JSR &FFD1
 1800 :
 1810 .loop   \ Start of
main loop
 1820 :
 1830 LDA wps
 1840 STA R
 1850 LDA wpib
 1860 STA RC
 1870 LDA &362
 1880 STA SR
 1890 LDA #0
 1900 STA SRC
 1910 LDA W
 1920 STA w2
 1930 LDA W+1
 1940 STA w2+1
 1950 LDA ST
 1960 STA ST2
 1970 LDA ST+1
 1980 STA ST2+1
 1990 LDA xs
 2000 STA xs2
 2010 LDA xs+1
 2020 STA xs2+1
 2030 LDA #0
 2040 STA BT
 2050 STA stxo
 2060 STA MSK
 2070 :
 2080 .loop2  \ Start of
second loop
 2090 :
 2100 LDY #0
 2110 LDA (ST2),Y
 2120 AND SR
 2130 LDX SRC
 2140 CPX RC
 2150 BEQ nomv
 2160 BCS bkwds
 2170 TAX
 2180 SEC
 2190 LDA RC
 2200 SBC SRC
 2210 TAY
 2220 TXA
 2230 .rloop3 LSR A
 2240 DEY
 2250 BNE rloop3
 2260 JMP nomv
 2270 .bkwds TAX
 2280 SEC
 2290 LDA SRC
 2300 SBC RC
 2310 TAY
 2320 TXA
 2330 .rloop4 ASL A
 2340 DEY
 2350 BNE rloop4
 2360 .nomv ORA BT
 2370 STA BT
 2380 LDA MSK
 2390 ORA R
 2400 STA MSK
 2410 LSR R
 2420 INC RC
 2430 LDA &361
 2440 CMP RC
 2450 BCS 1330
 2460 LDA &362
 2470 STA R
 2480 LDA #0
 2490 LDY #0
 2500 LDA MSK
 2510 EOR #&FF
 2520 AND (w2),Y
 2530 EOR BT
 2540 STA (w2),Y
 2550 LDA #0
 2560 STA BT
 2570 STA MSK
 2580 STA RC
 2590 CLC
 2600 LDA w2
 2610 ADC #8
 2620 STA w2
 2630 LDA w2+1
 2640 ADC #0
 2650 STA w2+1
 2660 .1330 CLC
 2670 LDA stx
 2680 ADC stxo
 2690 STA stxo
 2700 LDA stx+1
 2710 ADC SRC
 2720 STA SRC
 2730 STA temp
 2740 LDA stx+2
 2750 ADC #0
 2760 STA SRC+1
 2770 STA temp+1
 2780 LDA &361
 2790 STA temp+2
 2800 .rloop5 LSR temp+1
 2810 ROR temp
 2820 LSR temp+2
 2830 BNE rloop5
 2840 ASL temp
 2850 ROL temp+1
 2860 ASL temp
 2870 ROL temp+1
 2880 ASL temp
 2890 ROL temp+1
 2900 CLC
 2910 LDA ST2
 2920 ADC temp
 2930 STA ST2
 2940 LDA ST2+1
 2950 ADC temp+1
 2960 STA ST2+1
 2970 LDA &362
 2980 STA SR
 2990 LDA SRC
 3000 AND &361
 3010 STA SRC
 3020 CMP #0
 3030 BEQ 1370
 3040 LDY SRC
 3050 .rloop6
 3060 LSR SR
 3070 DEY
 3080 BNE rloop6
 3090 .1370
 3100 SEC
 3110 LDA xs2
 3120 SBC #1
 3130 STA xs2
 3140 LDA xs2+1
 3150 SBC #0
 3160 STA xs2+1
 3170 CMP #0
 3180 BNE bnb
 3190 LDA xs2
 3200 CMP #0
 3210 BEQ nbb
 3220 .bnb JMP loop2
 3230 :
 3240 .nbb LDY #0
 3250 LDA MSK
 3260 EOR #&FF
 3270 AND (w2),Y
 3280 EOR BT
 3290 STA (w2),Y
 3300 CLC
 3310 LDA W
 3320 ADC #1
 3330 STA W
 3340 LDA W+1
 3350 ADC #0
 3360 STA W+1
 3370 LDA W
 3380 AND #7
 3390 BNE notroub
 3400 CLC
 3410 LDA W
 3420 ADC &352
 3430 STA W
 3440 LDA W+1
 3450 ADC &353
 3460 STA W+1
 3470 SEC
 3480 LDA W
 3490 SBC #8
 3500 STA W
 3510 LDA W+1
 3520 SBC #0
 3530 STA W+1
 3540 .notroub
 3550 LDA W+1
 3560 BPL ntb2
 3570 LDX &356
 3580 BNE i10k
 3590 SEC
 3600 SBC #&50
 3610 STA W+1
 3620 JMP ntb2
 3630 .i10k SEC
 3640 SBC #&28
 3650 STA W+1
 3660 .ntb2
 3670 SEC
 3680 LDA ys
 3690 SBC #1
 3700 STA ys
 3710 LDA ys+1
 3720 SBC #0
 3730 STA ys+1
 3740 CMP #0
 3750 BNE 1400
 3760 LDA ys
 3770 CMP #0
 3780 BNE 1400
 3790 LDA #0
 3800 LDY handle
 3810 JMP &FFCE
 3820 .1400
 3830 CLC
 3840 LDA sty
 3850 ADC styo
 3860 STA styo
 3870 LDA sty+1
 3880 ADC #0
 3890 STA temp
 3900 LDA sty+2
 3910 ADC #0
 3920 STA temp+1
 3930 .rloop7 CLC
 3940 LDA ST
 3950 ADC #1
 3960 STA ST
 3970 LDA ST+1
 3980 ADC #0
 3990 STA ST+1
 4000 SEC
 4010 LDA ST
 4020 SBC #data MOD 256
 4030 AND #7
 4040 BNE 1410
 4050 SEC
 4060 LDA ST
 4070 SBC #8
 4080 STA ST
 4090 LDA ST+1
 4100 SBC #0
 4110 STA ST+1
 4120 LDA handle
 4130 STA &70
 4140 LDA #data MOD 256
 4150 STA &71
 4160 LDA #data DIV 256
 4170 STA &72
 4180 LDA &352
 4190 STA &75
 4200 LDA &353
 4210 STA &76
 4220 LDA #0
 4230 STA &73
 4240 STA &74
 4250 STA &77
 4260 STA &78
 4270 LDA #4
 4280 LDX #&70
 4290 LDY #0
 4300 JSR &FFD1
 4310 .1410 SEC
 4320 LDA temp
 4330 SBC #1
 4340 STA temp
 4350 LDA temp+1
 4360 SBC #0
 4370 STA temp+1
 4380 CMP #0
 4390 BNE plr
 4400 LDA temp
 4410 BEQ ploop
 4420 .plr JMP rloop7
 4430 .ploop JMP loop
 4440 :
 4450 .address LDA &72
 4460 EOR #&FF
 4470 STA &72
 4480 LSR A
 4490 LSR A
 4500 LSR A
 4510 ASL A
```

Continued ▶

◀ Hints & Tips, listing 2 continued

```
4520 TAY
4530 LDA (&E0),Y
4540 STA &74
4550 INY
4560 LDA (&E0),Y
4570 STA &73
4580 LDA &356
4590 CMP #2
4600 BNE nothalf
4610 LSR &74
4620 ROR &73
4630 .nothalf
4640 LDA &72
4650 AND #7
4660 CLC
4670 ADC &73
4680 STA &73
4690 LDA &70
4700 AND &361
4710 STA &72
4720 LDA &361
4730 .getloop
4740 LSR &71
4750 ROR &70
4760 LSR A
4770 BNE getloop
4780 ASL &70
4790 ROL &71
4800 ASL &70
4810 ROL &71
4820 ASL &70
4830 ROL &71
4840 CLC
4850 LDA &70
4860 ADC &73
4870 STA &70
4880 LDA &71
4890 ADC &74
4900 STA &71
4910 CLC
4920 LDA &70
4930 ADC &350
4940 STA &70
4950 LDA &71
4960 ADC &351
4970 STA &71
4980 LDA &71
4990 BPL getok
5000 SEC
5010 LDA &71
5020 SBC &354
5030 STA &71
5040 .getok RTS
5050 :
5060 .div LDX #24
5070 LDA #0
5080 STA temp2
5090 STA temp2+1
5100 STA temp2+2
5110 STA sty
5120 STA sty+1
5130 STA sty+2
5140 .divloop ASL temp
5150 ROL temp+1
5160 ROL temp+2
5170 ROL temp2
5180 ROL temp2+1
5190 ROL temp2+2
5200 BCS willgo
5210 SEC
5220 LDA temp2
5230 SBC temp1
5240 STA sty
5250 LDA temp2+1
5260 SBC temp1+1
5270 STA sty+1
5280 LDA temp2+2
5290 SBC temp1+2
5300 STA sty+2
5310 BCC wontgo
5320 .willgo LDA sty
5330 STA temp2
5340 LDA sty+1
5350 STA temp2+1
5360 LDA sty+2
5370 STA temp2+2
5380 INC temp
5390 .wontgo DEX
5400 BNE divloop
5410 LDA sty
5420 STA temp1
5430 LDA sty+1
5440 STA temp1+1
5450 LDA sty+2
5460 STA temp1+2
5470 RTS
5480 :
5490 .handle EQUB 0
5500 .ys EQUW 0
5510 .xs EQUW 0
5520 .W EQUW 0
5530 .ST EQUW 0
5540 .stx EQUW 0
5550 EQUB 0
5560 .sty EQUW 0
5570 EQUB 0
5580 .stxo EQUB 0
5590 .styo EQUB 0
5600 .wpib EQUB 0
5610 .wps EQUB 0
5620 .temp EQUW 0
5630 EQUB 0
5640 .temp1 EQUW 0
5650 EQUB 0
5660 .R EQUB 0
5670 .RC EQUB 0
5680 .SR EQUB 0
5690 .SRC EQUW 0
5700 .xs2 EQUW 0
5710 .BT EQUB 0
5720 .MSK EQUB 0
5730 .temp2 EQUW 0
5740 EQUB 0
5750 :
5760 .data:]
5770 P%=P%+&280
5780 [OPT I
5790 ]:NEXT
5800 ENDPROC
5810 :
5820 DEFPROCchecksum
5830 T%=0
5840 FOR I%=shrink TO d
ata-1
5850 T%=T%+?I%
5860 NEXT
5870 IF T%<>72733 THEN
PRINT "Checksum error" :
END
5880 ENDPROC
```

Listing 3

```
10 REM Picture Shrink Demo
20 REM for B/B+ only
30 REM by Andrew Bennett
40 REM (c) BAU Oct 89
50 :
60 MODE2
70 IF HIMEM > &3000 PRINT "Will not w
ork with Shadow RAM":END
80 FOR I=0 TO 50
90 GCOL 0,RND(7)
100 PLOT 85,RND(1279),RND(1023)
110 NEXT
120 *SAVE DemScr 3000 8000
130 CLS
140 FOR I=0 TO 5
150 A=RND(1179)
160 B=RND(923)
170 C=A+RND(1179-A)+100
180 D=B+RND(923-B)+100
190 VDU26,18,0,7
200 MOVE A-8,B-4
210 DRAW A-8,D+4
220 DRAW C+8,D+4
230 DRAW C+8,B-4
240 DRAW A-8,B-4
250 VDU24,A;B;C;D;18,0,0,16
260 *LPIC DemScr
270 NEXT
280 END
```

Listing 4

```
10 REM String Scroller
20 REM By Murray MacKenzie
30 REM For B/B+/M/C/E/A
40 REM (c) BAU Oct 89
50 :
60 MODE 6
70 VDU 23,1,0;0;0;0;
80 PROCscroll("Demonstration...",10,1
0)
90 GOTO 80
100 :
110 DEF PROCscroll(S$,x,y)
120 VDU31,x,y
130 A%=10:X%=&70:Y%=0
140 FOR char=1 TO LEN(S$)
150 X%?0=ASC(MID$(S$,char,1)):CALL&FFF
1
160 FOR line=1 TO 8
170 VDU 23,224
180 FOR lev=9-line TO 8
190 VDU X%?lev
200 NEXT lev
210 FOR space=1 TO 8-line
220 VDU 0
230 NEXT space
240 VDU 31,(x+char-1),y
250 VDU 224
260 NEXT line
270 NEXT char
280 VDU 10,13
290 ENDPROC
```

Listing 5

```
10 REM Scrolling Message
20 REM By Murray MacKenzie
30 REM For B/B+/M/C/E/A
40 REM (c) BAU Oct 89
50 :
60 MODE 6
70 VDU 23,1,0;0;0;0;
80 PRINT TAB(10,10)"Demonstration"
90 PRINT TAB(12,20);"Hit Space"
100 REPEAT UNTIL GET=32
110 PRINT TAB(12,20);"         "
120 PROCchange("Demonstration","Of Cha
nging",10,10)
130 PROCchange("Of Changing","Strings.
",10,10)
140 PRINT
150 END
160 :
170 DEF PROCchange(old$,new$,x,y)
180 A%=10:oldloc%=&70:newloc%=&900
190 oldblock%=&60
200 newblock%=&70
210 old=LEN(old$):new=LEN(new$)
220 IF old>new THEN len=old ELSE len=n
ew
230 FOR char=1 TO len
240 FOR line=0 TO 8
250 X%=oldblock% MOD 256
260 Y%=oldblock% DIV 256
270 oldblock%?0=ASC(MID$(old$,char,1))
280 CALL &FFF1
290 X%=newblock% MOD 256
300 Y%=newblock% DIV 256
310 newblock%?0=ASC(MID$(new$,char,1))
320 CALL &FFF1
330 VDU 23,224
340 IF line=0 THEN 390
350 FOR newlev=9-line TO 8
360 VDU newblock%?newlev
370 NEXT newlev
380 IF line=8 THEN 440
390 VDU 0
400 IF line=7 THEN 440
410 FOR oldlev=1 TO 7-line
420 VDU oldblock%?oldlev
430 NEXT oldlev
440 VDU 31,x+char-1,y,224
450 NEXT line
460 NEXT char
470 ENDPROC
```

Listing 6

```
10 REM ADFS File Wipe
20 REM By Murray MacK
enzie
30 REM for B+/E/M/C w
ith ADFS
40 REM (c) BAU Oct 89
50 :
60 osgbpb=&FFD1
70 osrdch=&FFE0
80 oswrch=&FFEE
90 osnewl=&FFE7
100 oscli=&FFF7
110 code%=&900
120 :
130 FOR pass=0 TO 3 ST
EP 3
140 P%=code%
150 [OPT pass
160 LDA #0
170 STA block+9
180 .fileloop
190 LDA #filename MOD
256
200 STA block+1
210 LDA #filename DIV
256
220 STA block+2
230 LDA #1
240 STA block+5
250 LDA #8
260 LDX #block MOD 256
270'LDY #block DIV 256
280 JSR osgbpb
290 LDA block+5
300 CMP #1
310 BEQ end
320 LDY #0
330 .printfile
340 LDA filename+1,Y
350 JSR oswrch
360 INY
370 CPY #17
380 BNE printfile
390 .choice
400 JSR osrdch
410 CMP #89
420 BEQ remove
430 CMP #121
440 BEQ remove
450 CMP #78
460 BEQ remain
470 CMP #110
480 BEQ remain
490 BNE choice
500 .remove
510 JSR oswrch
520 LDA #32
530 STA filename
540 LDA #13
550 STA filename+11
560 LDX #delete MOD 25
6
570 LDY #delete DIV 25
6
580 JSR oscli
590 LDA #40
```

Continued▶

ARC AGORA

◀ Hints & Tips, listing 6 continued

```
600 STA filename+11
610 JMP return
620 .remain
630 JSR oswrch
640 .return
650 JSR osnewl
660 JMP fileloop
670 .end
680 RTS
690 .delete
700 EQUS "DELETE"
710 .filename
720 EQUS STRING$(11,CHR$0)
730 EQUS "(Y/N) :"
740 .block
750 EQUS STRING$(12,CHR$0)
760 ]
770 NEXT
780 A$="*SAVE Wipe "+STR$~code%+" "+STR$~P%
790 PRINT A$
800 PRINT "Any Key To Save..."
810 REPEAT UNTIL GET
820 $&700=A$
830 X%=0
840 Y%=7
850 CALL oscli
860 END
```

See Arc Agora, page 30

Listing 1.

```
10 REM >Agora1
20 REM MakeTab
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU October 1989
60 :
70 DIM tab1% &100,tab2% &100
80 FOR x%=0 TO 255
90 x%?tab1%=0
100 x%?tab2%=0
110 NEXT
120 cur%=-1
130 j%=0
140 i%=0
150 REPEAT
160 WHILE FNlog(i%)=cur% AND i%<256
170 i%?tab2%=j%
180 i%+=1
190 ENDWHILE
200 j%?tab1%=FNlog(i%)
210 cur%=FNlog(i%)
220 j%+=1
230 UNTIL i%=256
240 SYS "OS_File",0,"Tab1",,,tab1%,tab1%+&100
250 SYS "OS_File",0,"Tab2",,,tab2%,tab2%+&100
260 PRINT"Now run listing 2..."
270 END
280 :
290 DEF FNlog(i%)
300 LOCAL j%
310 SYS "Sound_SoundLog",(i%-&80)<<24 TO j%
320 =j%
```

Listing 2.

```
10 REM >Agora2
20 REM BAUSound Source
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU October 1989
60 :
70 DIM code% &1000
80 group%=16
90 numbuf%=4
100 bufbits%=12
110 bufsize%=2^bufbits%
120 vbit=1<<28
130 bits=1:byte=2:refillcount=3
140 current=4:writebuf=5:smallest=5
150 bufbase=6:flags=7:dataend=8
160 databyte=9:bitsleft=10
170 dataread=11:convert=11
180 largest=12:bitsreq=12
190 value=0:amp=1:convaddr=2
200 time=4:read=5:readbuf=6
210 bufend=7:ptr=9
220 dmaend=10:dmastep=11:dmastart=12
230 sp=13:link=14:pc=15
240 FOR pass%=4 TO 6 STEP 2
250 P%=0:O%=code%
260 [OPT pass%
270 EQUD 0
280 EQUD initmod
290 EQUD quitmod
300 EQUD 0
310 EQUD voicename
320 EQUD help
330 EQUD commandtab
340 EQUD 0
350 EQUD 0
360 EQUD 0
370 :
380 .initmod
390 STMFD (sp)!,{link}
400 MOV R0,#6
410 LDR R3,required
420 SWI "OS_Module"
430 STR R2,workbase
440 LDMFD (sp)!,{pc}
450 :
460 .required
470 EQUD numbuf%*bufsize%
480 :
490 .quitmod
500 STMFD (sp)!,{link}
510 MOV R0,#7
520 LDR R2,workbase
530 SWI "OS_Module"
540 LDMFD (sp)!,{pc}
550 :
560 .commandtab
570 FNz("CompactSample")
580 EQUD compactsample
590 EQUD &0003FF02
600 EQUD compsyntax
610 EQUD comphelp
620 FNz("MemoryPlayBack")
630 EQUD memoryplayback
640 EQUD &0002FF02
650 EQUD playsyntax1
660 EQUD playhelp1
670 FNz("FilePlayBack")
680 EQUD fileplayback
690 EQUD &0001FF01
700 EQUD playsyntax2
710 EQUD playhelp2
720 EQUD 0
730 :
740 .comphelp
750 EQUS "*CompactSample produces a compacted version of a sound sample file."
760 EQUB 13
770 .compsyntax
780 FNz("Syntax: *CompactSample <filename> <filename> <ticks>")
790 .playhelp1
800 EQUS "*MemoryPlayBack plays back a compacted sound at a given memory"
810 EQUS " address."
820 EQUB 13
830 .playsyntax1
840 FNz("Syntax: *MemoryPlayBack <start> <length>")
850 .playhelp2
860 EQUS "*FilePlayBack plays back a compacted sound sample file"
870 EQUB 13
880 .playsyntax2
890 FNz("Syntax: *FilePlayBack <filename>")
900 :
910 .help
920 FNz("BAU-Sound"+CHR$9+"1.00 ("+MID$(TIME$,5,11)+")")
930 :
940 .voicebase
950 B fill
960 B fill
970 B gateon
980 B gateoff
990 LDMFD (sp)!,{pc}
1000 LDMFD (sp)!,{pc}
1010 LDMFD (sp)!,{pc}
1020 EQUD voicename-voicebase
1030 :
1040 .voicename
1050 FNz("BAU-Sound")
1060 :
1070 .gateon
1080 LDR value,workbase
1090 STR value,[ptr,#16]
1100 .fill
1110 LDMIA R9,{R1-R6}
1120 ADR convaddr,table1
1130 LDR readbuf,readingfrom
1140 .calcend
1150 LDR bufend,workbase
1160 ADD bufend,bufend,#bufsize%
1170 ADD bufend,bufend,readbuf,ASL #bufbits%
1180 .fillloop
1190 CMP read,bufend
1200 BLT notendbuf
1210 ADD readbuf,readbuf,#1
1220 CMP readbuf,#numbuf%
1230 MOVEQ readbuf,#0
1240 STR readbuf,readingfrom
1250 LDR read,workbase
1260 ADD read,read,readbuf,ASL #bufbits%
1270 B calcend
1280 .notendbuf
1290 LDRB value,[read],#1
1300 CMP value,#128
1310 STREQ value,finished
1320 LDRB value,[convaddr,value]
1330 STRB value,[dmastart],dmastep
1340 LDRB value,[read],#1
1350 LDRB value,[convaddr,value]
1360 STRB value,[dmastart],dmastep
1370 LDRB value,[read],#1
1380 LDRB value,[convaddr,value]
1390 STRB value,[dmastart],dmastep
1400 LDRB value,[read],#1
1410 LDRB value,[convaddr,value]
1420 STRB value,[dmastart],dmastep
1430 CMP dmastart,dmaend
1440 BLT fillloop
1450 SUBS time,time,#1
1460 STMIB R9,{R2-R5}
1470 MOVPL R0,#%00001000
1480 MOVMI R0,#%00000010
1490 LDMFD (sp)!,{pc}
1500 ]
1510 table1=P%
1520 SYS "OS_File",255,"Tab1",O%
1530 P%+=256:O%+=256
1540 [OPT pass%
1550 .gateoff
1560 MOV value,#0
1570 .flush
1580 STRB value,[dmastart],dmastep
1590 STRB value,[dmastart],dmastep
1600 STRB value,[dmastart],dmastep
1610 STRB value,[dmastart],dmastep
1620 CMP dmastart,dmaend
1630 BLT flush
1640 MOV R0,#%00000001
1650 LDMFD (sp)!,{pc}
1660 :
1670 .nofile
1680 EQUD 214
1690 FNz("Can't find sample file")
1700 :
1710 .fileplayback
1720 STMFD (sp)!,{link}
1730 BL copypars
1740 BL skipspaces
1750 STMFD (sp)!,{R0}
1760 BL skipnonspaces
1770 MOV R1,#13
1780 STRB R1,[R0]
1790 LDMFD (sp)!,{R1}
1800 MOV R0,#&40
1810 SWI "XOS_Find"
1820 BVS cantfile
1830 CMP R0,#0
1840 BEQ cantfile
1850 STR R0,inhandle
1860 MOV flags,#1
1870 BL mainplayback
1880 MOV R0,#0
1890 LDR R1,inhandle
1900 SWI "OS_Find"
1910 LDMFD (sp)!,{pc}
1920 .cantfile
1930 LDMFD (sp)!,{link}
1940 ADR R0,nofile
1950 ORRS pc,link,#vbit
1960 :
1970 .memoryplayback
1980 STMFD (sp)!,{link}
1990 BL copypars
2000 BL skipspaces
2010 STMFD (sp)!,{R0}
2020 BL skipnonspaces
2030 MOV R1,#13
2040 STRB R1,[R0],#1
2050 BL skipspaces
2060 MOV R1,#0
2070 MOV R2,#0
2080 SWI "XOS_EvaluateExpression"
2090 LDMFD (sp)!,{R0}
2100 BVS cantmem
2110 CMP R1,#0
2120 BNE cantmem
2130 STR R2,sourcesize
2140 MOV R1,#0
2150 MOV R2,#0
2160 SWI "XOS_EvaluateExpression"
2170 BVS cantmem
2180 CMP R1,#0
2190 BNE cantmem
2200 MOV dataread,R2
2210 LDR byte,sourcesize
2220 ADD dataend,dataread,byte
2230 MOV flags,#0
2240 BL mainplayback
2250 LDMFD (sp)!,{pc}
2260 .cantmem
2270 LDMFD (sp)!,{link}
2280 ADR R0,badmemory
2290 ORRS pc,link,#vbit
2300 :
2310 .badmemory
2320 EQUD 0
2330 FNz("Bad parameters")
2340 :
2350 .mainplayback
2360 STMFD (sp)!,{link}
2370 ADR R0,voicebase
2380 MOV R1,#0
2390 SWI "Sound_InstallVoice"
2400 STR R1,slot
2410 MOV bitsleft,#0
2420 MOV writebuf,#0
2430 MOV byte,#0
2440 STR byte,readingfrom
2450 STR byte,finished
2460 MOV R0,#0
2470 MOV R1,#0
2480 MOV R2,#0
2490 MOV R3,#0
2500 MOV R4,#0
2510 SWI "Sound_Configure"
2520 STMFD (sp)!,{R0-R4}
2530 MOV bits,#8
2540 BL multiread
2550 ADD R2,byte,byte,ASL #1
2560 MOV R2,R2,ASL #3
2570 MOV R0,#1
2580 MOV R1,#208
```

Continued ▶

```
 2590 MOV R3,#0
 2600 MOV R4,#0
 2610 SWI "Sound_Configure"
 2620 MOV bits,#8
 2630 BL multiread
 2640 MOV current,byte
 2650 .initrefill
 2660 BL refill
 2670 CMP writebuf,#0
 2680 BNE initrefill
 2690 STMFD (sp)!,{R0-R3}
 2700 SWI "Sound_QInit"
 2710 MOV R0,#1
 2720 ADR R1,voicename
 2730 SWI "Sound_AttachNamedVoice"
 2740 MVN R0,#0
 2750 MOV R1,#0
 2760 LDR R2,params
 2770 LDR R3,params+4
 2780 SWI "Sound_QSchedule"
 2790 LDMFD (sp)!,{R0-R3}
 2800 .playloop
 2810 LDR byte,readingfrom
 2820 CMP byte,writebuf
 2830 BLNE refill
 2840 SWI "OS_ReadEscapeState"
 2850 BCS escape
 2860 LDR byte,finished
 2870 CMP byte,#0
 2880 BEQ playloop
 2890 .escape
 2900 LDMFD (sp)!,{R0-R4}
 2910 SWI "Sound_Configure"
 2920 LDR R1,slot
 2930 SWI "Sound_RemoveVoice"
 2940 LDMFD (sp)!,{pc}
 2950 :
 2960 .params
 2970 EQUD &FFFF0001
 2980 EQUD &FFFF0080
 2990 :
 3000 .pars
 3010 EQUS STRING$(255," ")
 3020 EQUB 13
 3030 :
 3040 .copypars
 3050 ADR R2,pars
 3060 .copyloop
 3070 LDRB R1,[R0],#1
 3080 STRB R1,[R2],#1
 3090 CMP R1,#32
 3100 BGE copyloop
 3110 ADR R0,pars
 3120 MOV pc,link
 3130 :
 3140 .refill
 3150 STMFD (sp)!,{link}
 3160 LDR bufbase,workbase
 3170 ADD bufbase,bufbase,writebuf,ASL #bufbits%
 3180 MOV refillcount,#0
 3190 .refillloop
 3200 TST flags,#%10
 3210 MOVNE current,#128
 3220 BNE refillloop2
 3230 MOV bits,#3
 3240 BL multiread
 3250 STR byte,bitsneeded
 3260 MOV bits,#8
 3270 BL multiread
 3280 STR byte,diffbase
 3290 .refillloop2
 3300 TST flags,#%10
 3310 BEQ notplayedall
 3320 STRB current,[bufbase,refillcount]
 3330 B nextrefill
 3340 .notplayedall
 3350 LDR bits,bitsneeded
 3360 BL multiread
 3370 STRB current,[bufbase,refillcount]
 3380 ADD current,current,byte
 3390 LDR byte,diffbase
 3400 ADD current,current,byte
 3410 AND current,current,#255
 3420 .nextrefill
 3430 ADD refillcount,refillcount,#1
 3440 TST refillcount,#group%-1
 3450 BNE refillloop2
 3460 CMP refillcount,#bufsize%
 3470 BNE refillloop
 3480 ADD writebuf,writebuf,#1
 3490 CMP writebuf,#numbuf%
 3500 MOVEQ writebuf,#0
 3510 LDMFD (sp)!,{pc}
 3520 :
 3530 .multiread
 3540 CMP bits,#0
 3550 MOVEQ byte,#0
 3560 MOVEQ pc,link
 3570 CMP bits,bitsleft
 3580 BGT slowread
 3590 MOV byte,#1
 3600 MOV byte,byte,ASL bits
 3610 SUB byte,byte,#1
 3620 AND byte,databyte,byte
 3630 MOV databyte,databyte,ASR bits
 3640 SUB bitsleft,bitsleft,bits
 3650 MOV pc,link
 3660 .slowread
 3670 MOV byte,#0
 3680 STMFD (sp)!,{bits,link}
 3690 .multireadloop2
 3700 CMP bitsleft,#0
 3710 BLEQ bget
 3720 MOV byte,byte,ASR #1
 3730 MOVS databyte,databyte,ASR #1
 3740 ADDCS byte,byte,#128
 3750 SUB bitsleft,bitsleft,#1
 3760 SUBS bits,bits,#1
 3770 BNE multireadloop2
 3780 LDMFD (sp)!,{bits,link}
 3790 RSB bits,bits,#8
 3800 MOV byte,byte,ASR bits
 3810 MOV pc,link
 3820 :
 3830 .bget
 3840 TST flags,#%1
 3850 BNE bgetfile
 3860 CMP dataread,dataend
 3870 ORREQ flags,flags,#%10
 3880 LDRNEB databyte,[dataread],#1
 3890 MOV bitsleft,#8
 3900 MOV pc,link
 3910 .bgetfile
 3920 STMFD (sp)!,{R0,R1,link}
 3930 LDR R1,inhandle
 3940 SWI "OS_BGet"
 3950 ORRCS flags,flags,#%10
 3960 MOV databyte,R0
 3970 MOV bitsleft,#8
 3980 LDMFD (sp)!,{R0,R1,pc}
 3990 :
 4000 .skipspaces
 4010 LDRB R1,[R0]
 4020 CMP R1,#32
 4030 ADDEQ R0,R0,#1
 4040 BEQ skipspaces
 4050 MOV pc,link
 4060 :
 4070 .skipnonspaces
 4080 LDRB R1,[R0]
 4090 CMP R1,#32
 4100 ADDGT R0,R0,#1
 4110 BGT skipnonspaces
 4120 MOV pc,link
 4130 :
 4140 .compactbuf
 4150 EQUS STRING$(group%+1," ")
 4160 ALIGN
 4170 :
 4180 .fillinbuf
 4190 STMFD (sp)!,{R0,R1,link}
 4200 MOV refillcount,#1
 4210 .fillinbufloop
 4220 TST flags,#%10
 4230 MOVNE R0,#128
 4240 BNE nullfill
 4250 LDR R1,inhandle
 4260 SWI "OS_BGet"
 4270 ORRCS flags,flags,#%10
 4280 LDRCCB R0,[convert,R0]
 4290 .nullfill
 4300 STRB R0,[bufbase,refillcount]
 4310 ADD refillcount,refillcount,#1
 4320 CMP refillcount,#group%+1
 4330 BNE fillinbufloop
 4340 LDMFD (sp)!,{R0,R1,pc}
 4350 :
 4360 .compactsample
 4370 STMFD (sp)!,{link}
 4380 BL copypars
 4390 BL skipspaces
 4400 STMFD (sp)!,{R0}
 4410 BL skipnonspaces
 4420 MOV R1,#13
 4430 STRB R1,[R0],#1
 4440 BL skipspaces
 4450 STMFD (sp)!,{R0}
 4460 BL skipnonspaces
 4470 BL skipspaces
 4480 SUB R1,R1,#ASC"0"
 4490 CMP R1,#1
 4500 MOVLT R1,#1
 4510 CMP R1,#9
 4520 MOVGT R1,#1
 4530 STR R1,rate
 4540 LDMFD (sp)!,{R1}
 4550 MOV R0,#&80
 4560 SWI "XOS_Find"
 4570 BVS cantfile
 4580 CMP R0,#0
 4590 BEQ cantfile
 4600 STR R0,outhandle
 4610 LDMFD (sp)!,{R1}
 4620 MOV R0,#&40
 4630 SWI "XOS_Find"
 4640 BVS cantfile
 4650 CMP R0,#0
 4660 BEQ cantfile
 4670 STR R0,inhandle
 4680 MOV refillcount,#&1C
 4690 .skipheader
 4700 LDR R1,inhandle
 4710 SWI "XOS_BGet"
 4720 SUBS refillcount,refillcount,#1
 4730 BNE skipheader
 4750 MOV bitsleft,#8
 4760 MOV databyte,#0
 4770 MOV flags,#%00
 4780 ADR bufbase,compactbuf
 4790 ADR convert,table2
 4800 LDR R1,inhandle
 4810 SWI "OS_BGet"
 4820 LDRB R0,[convert,R0]
 4830 STRB R0,[bufbase]
 4840 BL fillinbuf
 4850 MOV bits,#8
 4860 LDRB byte,rate
 4870 BL multiwrite
 4880 MOV bits,#8
 4890 LDRB byte,[bufbase]
 4900 BL multiwrite
 4910 .compactloop
 4920 TST flags,#%10
 4930 BNE donecompact
 4940 LDRB current,[bufbase]
 4950 MOV smallest,#&100
 4960 MVN largest,#&100
 4970 MOV refillcount,#1
 4980 .compactloop2
 4990 LDRB byte,[bufbase,refillcount]
 5000 STMFD (sp)!,{byte}
 5010 SUBS byte,byte,current
 5020 CMP byte,smallest
 5030 MOVLT smallest,byte
 5040 CMP byte,largest
 5050 MOVGT largest,byte
 5060 LDMFD (sp)!,{current}
 5070 ADD refillcount,refillcount,#1
 5080 CMP refillcount,#group%+1
 5090 BNE compactloop2
 5100 SUB byte,largest,smallest
 5110 :
 5120 MOV bitsreq,#0
 5130 .howmanybits
 5140 CMP byte,#0
 5150 ADDNE bitsreq,bitsreq,#1
 5160 MOVNE byte,byte,ASR #1
 5170 BNE howmanybits
 5180 :
 5190 MOV byte,bitsreq
 5200 MOV bits,#3
 5210 BL multiwrite
 5220 MOV byte,smallest
 5230 MOV bits,#8
 5240 BL multiwrite
 5250 LDRB current,[bufbase]
 5260 MOV refillcount,#1
 5270 .writedataloop
 5280 LDRB byte,[bufbase,refillcount]
 5290 STMFD (sp)!,{byte}
 5300 SUB byte,byte,current
 5310 SUB byte,byte,smallest
 5320 MOV bits,bitsreq
 5330 BL multiwrite
 5340 LDMFD (sp)!,{current}
 5350 ADD refillcount,refillcount,#1
 5360 CMP refillcount,#group%+1
 5370 BNE writedataloop
 5380 LDRB byte,[bufbase,#group%]
 5390 STRB byte,[bufbase]
 5400 BL fillinbuf
 5410 B compactloop
 5430 .donecompact
 5440 MOV byte,#0
 5450 MOV bits,#8
 5460 BL multiwrite
 5480 MOV R0,#0
 5490 LDR R1,inhandle
 5500 SWI "OS_Find"
 5510 MOV R0,#0
 5520 LDR R1,outhandle
 5530 SWI "OS_Find"
 5540 LDMFD (sp)!,{pc}
 5550 :
 5560 .multiwrite
 5570 CMP bits,#0
 5580 MOVEQ pc,link
 5590 MOVS byte,byte,ASR #1
 5600 MOV databyte,databyte,ASR #1
 5610 ORRCS databyte,databyte,#128
 5620 SUBS bitsleft,bitsleft,#1
 5630 BNE nextwrite
 5640 STMFD (sp)!,{R0,R1,link}
 5650 LDR R1,outhandle
 5660 MOV R0,databyte
 5670 SWI "OS_BPut"
 5680 LDMFD (sp)!,{R0,R1,link}
 5690 MOV bitsleft,#8
 5700 .nextwrite
 5710 SUB bits,bits,#1
 5720 B multiwrite
 5730 :
 5740 .workbase
 5750 EQUD 0
 5760 .rate
 5770 EQUD 0
 5780 .diffbase
 5790 EQUD 0
 5800 .slot
 5810 EQUD 0
 5820 .bitsneeded
 5830 EQUD 0
 5840 .inhandle
 5850 EQUD 0
 5860 .outhandle
 5870 EQUD 0
 5880 .finished
 5890 EQUD 0
 5900 .readingfrom
 5910 EQUD 0
 5920 .sourcesize
 5930 EQUD 0
 5940 ]
 5950 table2=P%
 5960 SYS "OS_File",255,"Tab2",O%
 5970 P%+=256:O%+=256
 5980 NEXT pass%
 5990 mod$="BAUSound"
 6000 SYS "OS_File",0,mod$,,,code%,O%
 6010 SYS "OS_File",&12,mod$,&FFA
 6020 PRINT"Module saved as "mod$
 6030 END
 6040 :
 6050 DEF FNz(z$)
 6060 [OPT pass%
 6070 EQUS z$
 6080 EQUB 0
 6090 ALIGN
 6100 ]
 6110 =0
```

Continued ▶

SATELLITES

Listing 3

```
   10 REM >Agora3
   20 REM Local Variable
s
   30 REM by Terry Blunt
   40 REM for Archimedes
 with RISC OS
   50 REM (c) BAU Octobe
r 1989
   60 :
   70 a$="This is a test
 to check that no corrup
tion occurs on return"
   80 b=45
   90 a%=123
  100 *SET TEST This is
a string system variable
  110 PRINT'">>"FNos_var
("TEST")"<<"
  120 PRINT'a$''b" (shou
ld be 45)"'a%" (should b
e 123)"
  130 END
  140 :
  150 DEF FNos_var(a$)
  160 LOCAL a%,b%
  170 DIM a% -1
  180 SYS "OS_ReadVarVal
",a$,a%,255 TO ,,b%
  190 a%?b%=13
  200 =$a%
```

Listing 4

```
   10 REM >Agora4
   20 REM Scaled Sprites
   30 REM by Dave Acton
   40 REM for Archimedes
 with RISC OS
   50 REM (c) BAU Octobe
r 1989
   60 :
   70 MODE 9
   80 OFF
   90 DIM sp% &B000,scal
e% 16,wk% 10
  100 FOR c%=8 TO 15
  110 COLOUR c%,7
  120 NEXT
  130 !sp%=&B000
  140 sp%!4=0
  150 sp%!8=16
  160 sp%!12=16
  170 FOR c%=5 TO 1 STEP
 -1
  180 GCOL c%
  190 CIRCLE FILL 640,51
2,c%*100
  200 NEXT
  210 COLOUR 7
  220 PROCdc(10,"Change
rectangle size")
  230 PROCdc(13,"by movi
ng pointer.")
  240 COLOUR 6
  250 PROCdc(16,"Left bu
tton re-plots sprite")
  260 PROCdc(19,"Middle
button ends test")
  270 SYS "OS_SpriteOp",
256+16,sp%,"test",,0,0,1
279,1023
  280 *POINTER
  290 GCOL 4,0
  300 MOUSE x%,y%,b%
  310 PROCr
  320 REPEAT
  330 MOUSE mx%,my%,b%
  340 IF (b% AND 4)>0 TH
EN
  350 CLS
  360 !scale%=x%
  370 scale%!4=y%
  380 scale%!8=1280
  390 scale%!12=1024
  400 SYS "OS_SpriteOp",
52+256,sp%,"test",0,0,0,
scale%,-1
  410 PROCr
  420 ENDIF
  430 IF mx%<>x% OR my%<
>y% THEN
  440 PROCr
  450 x%=mx%
  460 y%=my%
  470 PROCr
  480 ENDIF
  490 UNTIL (b% AND 2)>0
  500 CLS
  510 *POINTER 0
  520 END
  530 :
  540 DEF PROCr
  550 RECTANGLE 0,0,x%,y
%
  560 ENDPROC
  570 :
  580 DEF PROCdc(y,t$)
  590 PRINTTAB(20-LENt$/
2,y);
  600 FOR t%=1 TO LEN(t$
)
  610 ?wk%=ASCMID$(t$,t%
)
  620 SYS "OS_Word",10,w
k%
  630 VDU 23,160,wk%?1,w
k%!1;wk%!2;wk%!3;wk%?4
  640 VDU 23,161,wk%?5,w
k%!5;wk%!6;wk%!7;wk%?8
  650 VDU 160,8,10,161,1
1
  660 NEXT
  670 ENDPROC
```

See Satellites, Page 69

```
   10 REM Satellite Positions
   20 REM by Michael Leete
   30 REM (c) BAU
   40 :
   50 DIM Sat$(13),az(13),az$(13)
   60 REM Constants in Kilometres
   70 Orbit=36000:Radius=6378
   80 @%=&2040A
   90 MODE 7
  100 PROCtitle(1)
  110 INPUT"Enter your name ";name$
  120 REPEAT
  130 INPUT'"Your Latitude (deg,min,sec)
 ",lat,min,sec
  140 mantissa=(min*60+sec)/3600
  150 lat=lat+mantissa
  160 UNTIL lat>=0 OR lat <=90
  170 REPEAT
  180 long=0:A$="exactly."
  190 INPUT'"Your Longitude (deg,min,sec
) ",long,min,sec
  200 mantissa=(min*60+sec)/3600
  210 long=long+mantissa
  220 UNTIL long>=0 OR long<=180
  230 IF long=0 GOTO 310
  240 REPEAT
  250 PRINT"Is Longitude EAST or WEST (E
 or W)";
  260 INPUT" ",A$
  270 IF A$="E":A$="East":GOTO 300
  280 IF A$="W":A$="West":GOTO 300
  290 PRINT"Enter E or W of the Prime Me
ridian."
  300 UNTIL A$="East" OR A$="West"
  310 PRINT''"Your position is:"
  320 PRINT'lat;" North ";long;" ";A$
  330 PRINT'CHR$(134)"Do you want to cha
nge this? (Y/N)"
  340 REPEAT A=FNget:UNTIL A=78 OR A=89:
IF A=89 GOTO 120
  350 @%=10
  360 PROCtitle(2)
  370 RESTORE
  380 FOR J%=1 TO 11
  390 READ Sat$(J%),az(J%),az$(J%)
  400 PRINTJ%;:IF J%=4 OR J%=10 PRINT CH
R$(130); ELSE PRINT CHR$(135);
  410 PRINT Sat$(J%);TAB(27)CHR$(135);TA
B(28);az(J%);TAB(33);:IF az$(J%)="E" PRI
NT"East" ELSE PRINT "West"
  420 NEXT
  430 @%=&2040A
  440 PRINT'CHR$(134)"Choose a Satellite
 (1 to 11) ";
  450 REPEAT
  460 INPUT" ",A%
  470 UNTIL A%>0 AND A%<14
  480 IF az$(A%)="E" az$(A%)="East" ELSE
 az$(A%)="West"
  490 PROCtitle(3)
  500 PROCpolarbear
  510 PROCelevation
  520 PRINT'''"The Elevation is: ";Eleva
tion;" degrees."
  530 PROCazimuth
  540 PRINT'"The Bearing is: ";azimuth;"
 degrees ";Dir$
  550 PRINT''''CHR$(134)"Any key to end.
 RETURN to re-RUN."
  560 A=GET:IF A=13 GOTO350 ELSE GOTO 57
0
  570 VDU26:CLS:END
  580 :
  590 DEF PROCpolarbear
  600 IF long=0 THEN P=az(A%):Dir$=az$(A
%):ENDPROC
  610 IF A$=az$(A%) THEN GOTO 630
  620 P=long+az(A%):Dir$=az$(A%):ENDPROC
  630 IF long=az(A%) THEN P=0:Dir$="due
South":ENDPROC
  640 IF long>az(A%) THEN P=long-az(A%):
PROCswap:ENDPROC
  650 IF long<az(A%) THEN P=az(A%)-long:
Dir$=az$(A%):ENDPROC
  660 :
  670 DEF PROCswap
  680 IF A$="West" Dir$="East" ELSE Dir$
="West"
  690 ENDPROC
  700 :
  710 DEF PROCazimuth
  720 OH=OV*TAN(Rlat)
  730 Raz=ACS(OH/OK)
  740 azimuth=DEG(Raz)
  750 ENDPROC
```

Continued ▶

```
 760 :
 770 DEF PROCelevation
 780 OV=Radius
 790 VS=Orbit+Radius
 800 Rlat=RAD(lat)
 810 RP=RAD(P)
 820 VH=OV/COS(Rlat)
 830 VK=VH/COS(RP)
 840 OK=SQR(VK^2-OV^2)
 850 KS=VS-VK
 860 KT=KS*OK/VK
 870 ST=KS*OV/VK
 880 OT=OK+KT
 890 Relevation=ATN(ST/OT)
 900 Elevation=DEG(Relevation)
 910 ENDPROC
 920 :
 930 DEF PROCtitle(K%)
 940 VDU 26,12:FOR J%=1 TO 2:PRINT TAB(
6,J%)CHR$(141)CHR$(148)CHR$(157)CHR$(131
)"Satellite Television   "CHR$(156):NEXT
 950 PROCsubhead(K%)
 960 VDU28,0,24,39,7
 970 ENDPROC
 980 :
 990 DEF PROCsubhead(K%)
1000 VDU 10:IF K%=1 PRINT TAB(11)"Obser
ver's Location"
1010 IF K%=2 PRINT TAB(12)"Orbital Loca
tion"
1020 IF K%=3 PRINT TAB(0,6)CHR$(134);Sa
t$(A%):PRINT'CHR$(134)"From the home of:
";name$
1030 ENDPROC
1040 :
1050 DEF FNget=GET AND 223
1060 :
1070 DATA"Itelsat V F5",63,E,"Itelsat V
 F15",60,E,"Gorizont 11",53,E,"Astra 1A"
,19.2,E,"Eutelsat 1 F4",13,E,"Telecom 1C
",5,W,"Gorizont 12",11,W,"Itelsat V F6",
18.5,W,"Itelsat VA F11",27.5,W,"BSB 1",3
1,W,"Itelsat V F4",34.5,W
```

See Take Note, Page 71

Listing 1. Segment

```
  10 REM Segment
  20 REM by Dave Acton
  30 REM for BBC B/B+/M/A
  40 REM (c) BAU October 1989
  50 :
  60 MODE 7
  70 arc%=(HIMEM>&B800)
  80 minpitch%=77
  90 off%=-24
 100 DIM phrase$(35),type%(35),order%(1
1)
 110 DIM numtype%(4),basetype%(4)
 120 DIM time%(2),vol%(2),pos%(2),stg%(
2)
 130 DIM bassdur%(4),basspitch%(4,4)
 140 DIM basspitch2%(4,1)
 150 PROCinitdata
 160 IF arc% PROCinitarc ELSE PROCinitb
eeb
 170 tempo%=16
 180 phrase%=0
 190 pos%(0)=1
 200 PRINT"Playing..."
 210 TIME=0
 220 REPEAT
 230 tt%=TIME
 240 IF tt%>=time%(0) PROCv1
 250 IF tt%>=time%(1) PROCv2
 260 IF tt%>=time%(2) PROCv3
 270 UNTIL FALSE
 280 END
 290 :
 300 DEF PROCv1
 310 byte%=EVAL("&"+MID$(phrase$(phrase
%),pos%(0),2))
 320 dur%=(byte% AND 7)*tempo%
 330 pitch%=(byte% DIV 8)*4+minpitch%
 340 PROCsound(1,pitch%,dur%)
 350 time%(0)=tt%+dur%
 360 pos%(0)=pos%(0)+2
 370 IF pos%(0)>LEN(phrase$(phrase%)) P
ROCnewphrase
 380 ENDPROC
 390 :
 400 DEF PROCv2
 410 pitch%=basspitch%(order%(stg%(1)),
pos%(1))
 420 dur%=bassdur%(pos%(1))*tempo%
 430 PROCsound(2,pitch%,dur%)
 440 pos%(1)=(pos%(1)+1) MOD 5
 450 IF pos%(1)=0 stg%(1)=(stg%(1)+1) M
OD 12
 460 time%(1)=tt%+dur%
 470 ENDPROC
 480 :
 490 DEF PROCv3
 500 pitch%=basspitch2%(order%(stg%(2))
,pos%(2))
 510 dur%=4*tempo%
 520 PROCsound(3,pitch%,dur%)
 530 pos%(2)=(pos%(2)+1) MOD 2
 540 IF pos%(2)=0 stg%(2)=(stg%(2)+1) M
OD 12
 550 time%(2)=tt%+dur%
 560 ENDPROC
 570 :
 580 DEF PROCsound(voice%,pitch%,dur%)
 590 IF arc% SOUND &10+voice%,vol%(voic
e%-1),pitch%+off%,dur% ELSE SOUND &10+vo
ice%,voice% MOD 2+1,pitch%+off%,dur%
 600 ENDPROC
 610 :
 620 DEF PROCnewphrase
 630 stg%(0)=(stg%(0)+1) MOD 12
 640 IF stg%(0)=0 AND RND(2)=1 THEN off
%=-40-off%
 650 phrase%=basetype%(order%(stg%(0)))
+RND(numtype%(order%(stg%(0))))-1
 660 pos%(0)=1
 670 ENDPROC
 680 :
 690 DEF PROCinitdata
 700 FOR i%=0 TO 11
 710 READ order%(i%)
 720 NEXT
 730 FOR i%=0 TO 4
 740 READ numtype%(i%)
 750 NEXT
 760 FOR i%=0 TO 4
 770 READ basetype%(i%)
 780 NEXT
 790 FOR i%=0 TO 4
 800 READ bassdur%(i%)
 810 NEXT
 820 FOR i%=0 TO 4
 830 FOR j%=0 TO 4
 840 READ basspitch%(i%,j%)
 850 NEXT
 860 NEXT
 870 FOR i%=0 TO 4
 880 FOR j%=0 TO 1
 890 READ basspitch2%(i%,j%)
 900 NEXT
 910 NEXT
 920 FOR i%=0 TO 35
 930 READ type%(i%),phrase$(i%)
 940 NEXT
 950 ENDPROC
 960 :
 970 DEF PROCinitarc
 980 LOADEVAL 4
 990 *CHANNELVOICE 1 WaveSynth-Beep
1000 *CHANNELVOICE 2 StringLib-Soft
1010 *CHANNELVOICE 3 StringLib-Soft
1020 vol%(0)=-12
1030 vol%(1)=-4
1040 vol%(2)=-4
1050 ENDPROC
1060 :
1070 DEF PROCinitbeeb
1080 ENVELOPE 1,1,0,0,0,1,1,1,126,-8,-3
,-3,80,60
1090 ENVELOPE 2,3,1,-1,0,1,1,1,90,-5,-3
,-3,70,60
1100 ENDPROC
1110 :
1120 DATA 0,0,0,1,2,2,0,0,3,4,0,0
1130 :
1140 DATA 21,3,6,3,3
1150 DATA 0,21,24,30,33
1160 :
1170 DATA 1,2,2,1,2
1180 :
1190 DATA 53,53,61,61,33
1200 DATA 53,53,53,49,53
1210 DATA 73,73,53,53,41
1220 DATA 33,33,49,33,33
1230 DATA 25,25,41,25,25
1240 :
1250 DATA 69,73,69,73,89,89,81,81,73,73
1260 :
1270 DATA 0,B2515A516A
1280 DATA 0,B2515A5132
1290 DATA 0,6A626A82
1300 DATA 0,9469616961
1310 DATA 0,322A3153
1320 DATA 0,3129312931415159
1330 DATA 0,6B6961695941
1340 DATA 0,CAB1B9CB69
1350 DATA 0,928291816951
1360 DATA 0,3222325A
1370 DATA 0,9151693151093151
1380 DATA 0,6969696A696951
1390 DATA 0,936A515961
1400 DATA 0,6B52091929
1410 DATA 0,69696A7A92
1420 DATA 0,B1B1B2A292
1430 DATA 0,5151595169519169
1440 DATA 0,B1B26A8152
1450 DATA 0,6E92
1460 DATA 0,926A0A6A
1470 DATA 0,5159695191698169
1480 DATA 1,3129314151699169
1490 DATA 1,3451315169
1500 DATA 1,6C69696951
1510 DATA 2,5C34
1520 DATA 2,19593179599179B9
1530 DATA 2,7A717A7291
1540 DATA 2,5A515AB192
1550 DATA 2,59515979928A
1560 DATA 2,7A5A92A2
1570 DATA 3,896941698969A189
1580 DATA 3,0901091929094109
1590 DATA 3,6A616959412A
1600 DATA 4,5A5159795992
1610 DATA 4,6961696159412909
1620 DATA 4,79593159795991A1
```

Listing 2. Impro

```
  10 REM Impro
  20 REM by Dave Acton
  30 REM for BBC B/B+/M/A
  40 REM (c) BAU October 1989
  50 :
  60 MODE 7
  70 arc%=(HIMEM>&B800)
  80 tempo%=8
  90 bars%=16
 100 crotchetlength%=4
 110 crotchetsperbar%=3
 120 barlength%=crotchetlength%*crotche
tsperbar%
 130 total%=bars%*barlength%
 140 IF arc% voices%=3 ELSE voices%=2
 150 DIM pitch%(total%,voices%-1),dur%(
total%,voices%-1)
 160 DIM harmony%(total%,11)
 170 DIM key%(bars%),int%(6),vol%(3)
 180 DIM place%(voices%-1),time%(voices
%-1),done%(voices%-1)
 190 FOR i%=0 TO 6
 200 READ int%(i%)
 210 NEXT
 220 PRINT"Please wait..."
```

Continued ▶

◀ Take Note, listing 2 continued

```
230 FOR b%=0 TO bars%-1
240 READ key%(b%)
250 NEXT
260 FOR b%=0 TO total%
270 keynote%=(b% MOD 4=0)
280 IF keynote% FOR i%=0 TO 4 STEP 2:harmony%(b%,int%(i%))=TRUE:NEXT
290 IF NOT keynote% FOR i%=0 TO 6:harmony%(b%,int%(i%))=TRUE:NEXT
300 NEXT
310 REPEAT
320 curpitch%=RND(12)-1
330 UNTIL harmony%(0,curpitch% MOD 12)
340 FOR b%=0 TO bars%-1
350 PRINT"Bar: ";b%
360 PROCmakebass(b%,0)
370 PROCcompose(b%,1)
380 IF arc% PROCcompose(b%,2)
390 NEXT
400 IF arc% PROCinitarc ELSE PROCinitbeeb
410 PROCplayback
420 END
430 :
440 DEF PROCmakebass(bar%,voice%)
450 LOCAL beatpos%,beatend%,range%
460 beatpos%=bar%*barlength%
470 PROCaddnote(0,4)
480 PROCaddnote(0,2)
490 PROCaddnote(0,4)
500 PROCaddnote(0,2)
510 ENDPROC
520 :
530 DEF PROCaddnote(pitch%,dur%)
540 pitch%(beatpos%,voice%)=pitch%
550 dur%(beatpos%,voice%)=dur%
560 beatpos%=beatpos%+dur%
570 ENDPROC
580 :
590 DEF PROCcompose(bar%,voice%)
600 LOCAL beatpos%,beatend%,range%,i%,attempts%
610 REPEAT
620 beatpos%=bar%*barlength%
630 beatend%=beatpos%+barlength%
640 FOR i%=0 TO barlength%-1
650 pitch%(beatpos%+i%,voice%)=0
660 dur%(beatpos%+i%,voice%)=0
670 NEXT
680 attempts%=0
690 REPEAT
700 k%=RND(4)
710 IF k%=1 failed%=FNa
720 IF k%=2 failed%=FNb
730 IF k%=3 failed%=FNc
740 IF k%=4 failed%=FNd
750 IF failed% THEN attempts%=attempts%+1
760 UNTIL beatpos%=beatend% OR attempts%>10
770 UNTIL beatpos%=beatend%
780 ENDPROC
790 :
800 DEF FNa
810 IF beatend%-beatpos%<6 THEN =TRUE
820 IF FNseq(1,4,0,6,6) THEN =TRUE
830 =FNseq(1,2,0,6,6)
840 :
850 DEF FNb:IF beatend%-beatpos%>=12 THEN =FNseq(1,12,0,8,8) ELSE =TRUE
860 :
870 DEF FNc:IF beatend%-beatpos%>=6 THEN =FNseq(1,6,0,8,8) ELSE =TRUE
880 :
890 DEF FNd:IF beatend%-beatpos%>=6 THEN =FNseq(3,2,0,8,3) ELSE =TRUE
900 :
910 DEF FNseq(notes%,notelength%,minrange%,range%,smallrange%)
920 LOCAL n%,pitch%,fail%,a%
930 fail%=0
940 REPEAT
950 newpitch%=FNrandomnote(curpitch%,0,18,range%)
960 UNTIL harmony%(beatpos%+notes%*notelength%,newpitch% MOD 12) AND ABS(newpitch%-curpitch%)>=minrange%
970 REPEAT
980 pos%=beatpos%
990 pitch%=curpitch%
1000 FOR i%=0 TO notes%*notelength%-1
1010 pitch%(beatpos%+i%,voice%)=0
1020 dur%(beatpos%+i%,voice%)=0
1030 NEXT
1040 n%=1
1050 REPEAT
1060 pitch%(pos%,voice%)=pitch%
1070 dur%(pos%,voice%)=notelength%
1080 pos%=pos%+notelength%
1090 IF n%<notes% PROCseq2
1100 n%=n%+1
1110 UNTIL n%>notes% OR fail%>10
1120 a%=ABS(newpitch%-pitch%)
1130 IF a%>range% fail%=fail%+1
1140 UNTIL a%<=range% OR fail%>10
1150 failed%=fail%>10
1160 IF fail%>10 THEN =TRUE
1170 beatpos%=pos%
1180 curpitch%=newpitch%
1190 =FALSE
1200 :
1210 DEF PROCseq2
1220 LOCAL pitch2%
1230 REPEAT
1240 pitch2%=FNrandomnote(pitch%,0,18,smallrange%)
1250 UNTIL harmony%(pos%,pitch2% MOD 12)
1260 pitch%=pitch2%
1270 ENDPROC
1280 :
1290 DEF FNrandomnote(current%,min%,max%,range%)
1300 LOCAL r%,ok%,try%,failed%
1310 ok%=FALSE
1320 failed%=0
1330 REPEAT
1340 try%=0
1350 REPEAT
1360 r%=RND(max%-min%)-1
1370 IF ABS(r%-current%)<=range% ok%=TRUE ELSE try%=try%+1
1380 IF r%=current% AND failed%<2 ok%=FALSE
1390 UNTIL ok% OR (try%>10)
1400 IF try%>10 range%=range%+1:failed%=failed%+1
1410 UNTIL ok%
1420 =r%
1430 :
1440 DEF PROCplayback
1450 PRINT"Playing..."
1460 TIME=0
1470 REPEAT
1480 FOR v%=0 TO voices%-1
1490 done%(v%)=FALSE:place%(v%)=0
1500 NEXT
1510 fin%=0
1520 REPEAT
1530 FOR v%=0 TO voices%-1
1540 IF TIME>=time%(v%) AND NOT done%(v%) PROCplay
1550 NEXT
1560 UNTIL fin%=voices%
1570 UNTIL FALSE
1580 ENDPROC
1590 :
1600 DEF PROCplay
1610 pitch%=1+4*(key%(place%(v%) DIV barlength%)+pitch%(place%(v%),v%))
1620 dur%=dur%(place%(v%),v%)
1630 IF pitch%(place%(v%),v%)>-1 PROCsound
1640 time%(v%)=time%(v%)+dur%*tempo%
1650 place%(v%)=place%(v%)+dur%
1660 IF place%(v%)=total% done%(v%)=TRUE:fin%=fin%+1
1670 ENDPROC
1680 :
1690 DEF PROCsound
1700 IF arc% SOUND &11+v%,vol%(v%),pitch%+v%*48,dur%*tempo% ELSE SOUND &11+v%,v%+1,pitch%+v%*48,dur%*tempo%
1710 ENDPROC
1720 :
1730 DEF PROCinitarc
1740 LOADEVAL 4
1750 *CHANNELVOICE 1 StringLib-Soft
1760 *CHANNELVOICE 2 WaveSynth-Beep
1770 *CHANNELVOICE 3 WaveSynth-Beep
1780 *CHANNELVOICE 4 WaveSynth-Beep
1790 vol%(0)=-4
1800 vol%(1)=-10
1810 vol%(2)=-10
1820 vol%(3)=-10
1830 ENDPROC
1840 :
1850 DEF PROCinitbeeb
1860 ENVELOPE 1,1,0,0,0,1,1,1,126,-8,-3,-3,80,60
1870 ENVELOPE 2,3,0,0,0,1,1,1,90,-7,-3,-3,70,60
1880 ENDPROC
1890 :
1900 DATA 0,2,4,5,7,9,11
1910 DATA 4,4,4,4,0,0,0,0,4,4,4,4,2,0,4,4
```

See New Order, page 79

Listing 1. ADFS Manager

```
10 REM ADFS Disc Manager
20 REM by David Harper
30 REM for any BBC Micro with ADFS
40 REM Version 4.16
50 :
60 PROCparams
70 MODE md%
80 HIMEM=HIMEM-stsz%-517
90 ON ERROR REPORT:PRINT:PROCend
100 PROCinit
110 MODE md%
120 PROCdisplay
130 ON ERROR PROCerror
140 PROCwork
150 :
160 DEF PROCparams
170 md%=&87
180 max%=&100:stsz%=&200
190 wsz%=20
200 in%=2:mg%=3
210 ccl%=4:mcl%=1
220 fcl%=7:dcl%=2
230 *FX 11,35
240 *FX 12,5
250 ENDPROC
260 :
270 DEF PROCinit
280 PROCheading(2)
290 mcl%=mcl%+&80:ccl%=ccl%+&80
300 dcl%=dcl%+&80:fcl%=fcl%+&80
310 DIM ctblk% 17,nmblk% 10
320 cbhi%=ctblk% DIV 256
330 DIM cliblk% 255
340 clih%=cliblk% DIV 256
350 n$=STRING$(10,"*")
360 K$=n$:cmd$=n$:kpn$=n$
370 T$=n$+n$
380 DIM dp% max%,dfl% max%
390 DIM acc% max%,mk% max%
400 DIM nm$(max%)
410 FOR I%=1 TO max%
420 nm$(I%)=n$:mk%?I%=0
430 NEXT
440 S$=STRING$(255,"*"):xd$=S$
450 DIM acd$(3)
460 FOR I%=0 TO 3
470 READ acd$(I%)
480 NEXT
```

Continued▶

◀ **New Order, listing 1 continued**

```
 490 DATA R,W,E,L
 500 nm$(0)="$"
 510 ?dp%=0:?dfl%=1:?acc%=9:?mk%=0
 520 PRINT'''CHR$131;"Enter drive numbe
r:";CHR$135;
 530 REPEAT
 540 K$=GET$
 550 UNTIL INSTR("0145ABEF",K$)
 560 PRINT K$
 570 VDU 23,1,0;0;0;0;31,0,9,129
 580 PRINT "Please wait. Disc being rea
d."
 590 PROCreadin(K$)
 600 *FX 4,1
 610 *FX 200,1
 620 cp%=0:rct%=0:tps%=-mg%:daf%=FALSE
 630 ENDPROC
 640 :
 650 DEF PROCheading(B%)
 660 FOR I%=0 TO 1
 670 VDU 31,4,B%+I%
 680 VDU 141,147,238,157,132
 690 PRINT SPC3;"ADFS Disc Manager";
 700 VDU 147,255,158,156,189
 710 NEXT
 720 ENDPROC
 730 :
 740 DEF PROCreadin(K$)
 750 PROCoscli("MOUNT "+K$)
 760 gpblk%=HIMEM+stsz%
 770 S%=stsz%-1:N%=1:D%=1
 780 PROCread
 790 last%=N%-1
 800 ENDPROC
 810 :
 820 DEF PROCread
 830 LOCAL M%,ds%
 840 A%=8:X%=ctblk%:Y%=ctblk% DIV 256
 850 ctblk%!1=gpblk%:ctblk%!5=47
 860 ctblk%!9=0
 870 CALL &FFD1
 880 Z%=47-ctblk%?5
 890 IF Z%=0:ENDPROC
 900 P%=gpblk%:ds%=0
 910 FOR J%=1 TO Z%
 920 n$=""
 930 FOR I%=1 TO ?P%
 940 n$=n$+CHR$(P%?I%)
 950 NEXT
 960 n$=FNstrip(n$)
 970 P%=P%+?P%+1
 980 ac%=FNgetac(n$)
 990 IF isd%:PROCpushdir:ELSE:PROCset
1000 NEXT
1010 IF ds%=0:ENDPROC
1020 FOR M%=1 TO ds%
1030 n$=FNpulldir
1040 PROCtestroom
1050 nm$(N%)=n$:N%=N%+1
1060 PROCoscli("DIR "+n$)
1070 D%=D%+1
1080 PROCread
1090 D%=D%-1
1100 *DIR ^
1110 NEXT
1120 ENDPROC
1130 :
1140 DEF PROCpushdir
1150 PROCpush(ac%)
1160 FOR I%=LENn$ TO 1 STEP -1
1170 PROCpush(ASCMID$(n$,I%,1))
1180 NEXT
1190 PROCpush(LENn$)
1200 ds%=ds%+1
1210 ENDPROC
1220 :
1230 DEF PROCpush(B%)
1240 S%?HIMEM=B%
1250 S%=S%-1
1260 IF S%<0:PROCbad("Disc structure to
o complex"):PROCend
1270 ENDPROC
1280 :
1290 DEF FNpulldir
1300 n$=""
1310 B%=FNpull
1320 FOR I%=1 TO B%
1330 n$=n$+CHR$FNpull
1340 NEXT
1350 dp%?N%=D%:dfl%?N%=1
1360 acc%?N%=FNpull
1370 =n$
1380 :
1390 DEF FNpull
1400 S%=S%+1
1410 =S%?HIMEM
1420 :
1430 DEF PROCset
1440 PROCtestroom
1450 dp%?N%=D%
1460 acc%?N%=ac%
1470 dfl%?N%=0
1480 nm$(N%)=n$:N%=N%+1
1490 ENDPROC
1500 :
1510 DEF PROCtestroom
1520 IF N%<=max%:ENDPROC
1530 PROCbad("Too many items on disc")
1540 PROCend
1550 :
1560 DEF FNstrip(n$)
1570 IF RIGHT$(n$,1)<>" ":=n$
1580 REPEAT:n$=LEFT$(n$,LENn$-1)
1590 UNTIL RIGHT$(n$,1)<>" "
1600 =n$
1610 :
1620 DEF FNgetac(n$)
1630 $nmblk%=n$:!ctblk%=nmblk%
1640 A%=5:X%=ctblk%:Y%=cbhi%
1650 A%=USR(&FFDD) AND &FF
1660 isd%=FALSE
1670 IF A%=&FF:=4
1680 IF A%=2:isd%=TRUE
1690 =ctblk%?14
1700 :
1710 DEF PROCoscli(S$)
1720 $cliblk%=S$
1730 X%=cliblk%:Y%=clih%
1740 CALL &FFF7
1750 ENDPROC
1760 :
1770 DEF PROCdisplay
1780 PROCwindow:CLS
1790 IF tps%>cp%-mg%:tps%=cp%-mg%
1800 IF tps%<cp%-wsz%+mg%:tps%=cp%-wsz%
+mg%
1810 IF tps%<0:F%=0:VDU 31,0,-tps%:ELSE
:F%=tps%
1820 L%=wsz%+tps%
1830 IF L%>last%+1:L%=last%+1
1840 FOR N%=F% TO L%
1850 PROCline(N%)
1860 NEXT
1870 ENDPROC
1880 :
1890 DEF PROCwindow
1900 VDU 23,1,0;0;0;0;28,0,wsz%,39,0
```

Continued ▶

◀ **New Order, listing 1 continued**

```
1910 ENDPROC
1920 :
1930 DEF PROCline(N%)
1940 IF N%>last%:VDU 31,3,N%-tps%,133:P
RINT STRING$(11,"_  ");:ENDPROC
1950 C%=mcl%*mk%?N% OR ccl%*-(N%=cp%)
1960 VDU 31,in%*dp%?N%,N%-tps%
1970 IF C% AND &F:VDU C%,157:ELSE:VDU 3
2,32
1980 IF dfl%?N%:VDU dcl%:ELSE:VDU fcl%
1990 PRINT nm$(N%);
2000 IF daf%:PRINT TAB(36,VPOS);FNacst(
acc%?N%);:ELSE:VDU 32,32,156
2010 ENDPROC
2020 :
2030 DEF FNacst(ac%)
2040 ac$=""
2050 FOR I%=3 TO 0 STEP -1
2060 IF ac% AND 2^I%:ac$=ac$+acd$(I%)
2070 NEXT
2080 =ac$
2090 :
2100 DEF PROCcmwind
2110 VDU 28,0,24,39,wsz%+2,23,1,1;0;0;0
;
2120 ENDPROC
2130 :
2140 DEF PROCwork
2150 REPEAT
2160 PROCcmwind
2170 PRINT TAB(0,22-wsz%);CHR$134;"Comm
and:";CHR$135;
2180 cmd$=""
2190 REPEAT
2200 K%=GET
2210 IF K%=136 OR K%=138 OR K%=139:PROC
csmove(K%)
2220 IF K%=9:PROCswapac
2230 IF K%=135:PROCmark
2240 IF K%>32 AND K%<127:VDU K%:cmd$=cm
d$+CHR$K%
2250 IF K%=127 AND LENcmd$>0:VDU K%:cmd
$=LEFT$(cmd$,LENcmd$-1)
2260 UNTIL K%=13:PRINT
2270 cmd$=FNcap(cmd$)
2280 IF FNcmd("CLEAR"):PROCclear
2290 IF FNcmd("ACCESS"):PROCaccess
2300 IF FNcmd("MOVE"):PROCmove
2310 IF FNcmd("DIRMOVE"):PROCdirmove
2320 IF FNcmd("RENAME"):PROCrename
2330 IF FNcmd("CDIR"):PROCcdir
2340 IF FNcmd("DELETE"):PROCdelete
2350 IF FNfullcmd("WIPE"):PROCwipe
2360 IF FNfullcmd("KILL"):PROCkill
2370 IF FNfullcmd("ANNIHILATE"):PROCann
ih
2380 IF FNcmd("QUIT"):PROCquit
2390 IF FNcmd("EXIT"):PROCexit
2400 IF FNcmd("HELP"):PROChelp
2410 IF LENcmd$>0:PROCbad("Unknown comm
and. Type 'HELP' for help.")
2420 UNTIL FALSE
2430 :
2440 DEF PROCcsmove(K%)
2450 PROCflst
2460 PROCbar(cp%,mcl%*mk%?cp%)
2470 IF K%=136:PROCleft
2480 IF K%=138:PROCdown
2490 IF K%=139:PROCup
2500 PROCbar(cp%,ccl% OR mcl%*mk%?cp%)
2510 PROCflrg
2520 ENDPROC
2530 :
2540 DEF PROCflst
2550 fp%=POS:fv%=VPOS
2560 PROCwindow
2570 ENDPROC
2580 :
2590 DEF PROCflrg
2600 PROCcmwind
2610 VDU 31,fp%,fv%
2620 ENDPROC
2630 :
2640 DEF PROCbar(N%,C%)
2650 VDU 31,in%*dp%?N%,N%-tps%
2660 IF C% AND &F:VDU C%,157:ELSE:VDU 3
2,32
2670 ENDPROC
2680 :
2690 DEF PROCleft
2700 IF cp%=0:ENDPROC
2710 D%=dp%?cp%
2720 REPEAT
2730 PROCup
2740 UNTIL dp%?cp%<D%
2750 ENDPROC
2760 :
2770 DEF PROCdown
2780 IF cp%=last%:ENDPROC
2790 IF cp%-tps%>wsz%-mg%-1:PROCscup
2800 cp%=cp%+1
2810 ENDPROC
2820 :
2830 DEF PROCscup
2840 VDU 31,0,wsz%,10
2850 tps%=tps%+1
2860 IF wsz%+tps%<=last%+1:PROCline(wsz
%+tps%)
2870 ENDPROC
2880 :
2890 DEF PROCup
2900 IF cp%=0:ENDPROC
2910 IF cp%-tps%<mg%+1:PROCscdn
2920 cp%=cp%-1
2930 ENDPROC
2940 :
2950 DEF PROCscdn
2960 VDU 30,11
2970 tps%=tps%-1
2980 IF tps%>=0:PROCline(tps%)
2990 ENDPROC
3000 :
3010 DEF PROCswapac
3020 PROCflst
3030 daf%=NOT daf%
3040 PROCdisplay
3050 PROCflrg
3060 ENDPROC
3070 :
3080 DEF PROCmark
3090 IF cp%=0:VDU 7:ENDPROC
3100 PROCflst
3110 mk%?cp%=mk%?cp% EOR 1
3120 PROCbar(cp%,ccl% OR mcl%*mk%?cp%)
3130 PROCflrg
3140 ENDPROC
3150 :
3160 DEF FNcap(S$)
3170 IF S$="":=""
3180 T$=""
3190 FOR I%=1 TO LENS$
3200 B%=ASCMID$(S$,I%,1)
3210 IF B%>96 AND B%<123:B%=B%-32
3220 T$=T$+CHR$B%
3230 NEXT
3240 =T$
```

Continued ▶

YELLOW PAGES

ADFS

◀ New Order, listing 1 continued

```
3250 :
3260 DEF FNcmd(S$)
3270 IF LENcmd$>LENS$ OR cmd$="":=FALSE
3280 IF INSTR(S$,cmd$)=1:cmd$="":=TRUE
3290 =FALSE
3300 :
3310 DEF FNfullcmd(S$)
3320 IF cmd$=S$:cmd$="":=TRUE:ELSE:=FALSE
3330 :
3340 DEF PROCclear
3350 FOR N%=0 TO last%
3360 mk%?N%=0
3370 NEXT
3380 PROCdisplay
3390 ENDPROC
3400 :
3410 DEF PROCaccess
3420 I%=0
3430 FOR N%=0 TO last%
3440 IF mk%?N%:I%=I%+1
3450 NEXT
3460 IF I%=0:PROCbad("No marks set"):ENDPROC
3470 PRINT CHR$131;"Enter access codes: ";CHR$135;
3480 INPUT ""ac$
3490 FOR N%=0 TO last%
3500 IF mk%?N%:PROCseldir(N%):PROCoscli("ACCESS "+nm$(N%)+" "+ac$):acc%?N%=FNgetac(nm$(N%))
3510 NEXT
3520 PROCclear
3530 ENDPROC
3540 :
3550 DEF PROCseldir(N%)
3560 PROCselthis(FNtodir(N%))
3570 ENDPROC
3580 :
3590 DEF FNtodir(N%)
3600 D%=dp%?N%
3610 REPEAT
3620 N%=N%-1
3630 UNTIL dp%?N%<D%
3640 =N%
3650 :
3660 DEF PROCselect(N%)
3670 IF dfl%?N%=0:N%=FNtodir(N%)
3680 PROCselthis(N%)
3690 ENDPROC
3700 :
3710 DEF PROCselthis(N%)
3720 IF N%=rct%:ENDPROC
3730 IF N%=0:PROCselrt:ENDPROC
3740 xd$=FNxst(rct%,N%)
3750 PROCoscli("DIR "+xd$)
3760 rct%=N%
3770 ENDPROC
3780 :
3790 DEF PROCselrt
3800 *DIR $
3810 rct%=0
3820 ENDPROC
3830 :
3840 DEF FNxst(st%,end%)
3850 LOCAL N%
3860 IF st%=end%:=""
3870 IF end%>st%:F%=st%:L%=end%:ELSE:F%=end%:L%=st%
3880 N%=F%:Q%=dp%?(N%+1)
3890 REPEAT
3900 N%=N%+1
3910 D%=dp%?N%
3920 IF D%<Q%:Q%=D%
3930 UNTIL N%=L%
3940 IF dp%?end%<Q%:xd$=STRING$(dp%?st%-Q%+1,"^."):=LEFT$(xd$,LENxd$-1)
3950 xd$=""
3960 FOR D%=dp%?end% TO Q% STEP -1
3970 N%=end%+1
3980 REPEAT
3990 N%=N%-1
4000 UNTIL dp%?N%=D%
4010 xd$=nm$(N%)+"."+xd$
4020 NEXT
4030 xd$=STRING$(dp%?st%-Q%+1,"^.")+xd$
4040 =LEFT$(xd$,LENxd$-1)
4050 :
4060 DEF PROCmove
4070 IF NOT FNcheck("MOVE"):ENDPROC
4080 IF dfl%?cp%=0:PROCbad("Directory not selected"):ENDPROC
4090 M%=0
4100 REPEAT
4110 M%=M%+1
4120 UNTIL M%>last% OR ((acc%?M% AND 4)>0 AND mk%?M%)
4130 IF M%<=last%:PROCgoto(M%):PROCbad("Can't MOVE 'Execute only' file"):ENDPROC
4140 M%=0
4150 REPEAT
4160 M%=M%+1
4170 IF mk%?M%:PROCshift(M%,cp%,FALSE,1):IF M%<cp%:M%=M%-1
4180 UNTIL M%=last%
4190 PROCdisplay
4200 ENDPROC
4210 :
4220 DEF FNcheck(S$)
4230 I%=0:J%=0
4240 FOR N%=0 TO last%
4250 IF mk%?N%:I%=I%+1:IF dfl%?N%:J%=N%
4260 NEXT
4270 IF J%>0:PROCgoto(J%):PROCbad("Can't "+S$+" directory"):=FALSE
4280 IF I%=0:PROCbad("No files marked"):=FALSE
4290 =TRUE
4300 :
4310 DEF PROCgoto(N%)
4320 PROCwindow
4330 IF cp%=N%:ENDPROC
4340 PROCbar(cp%,mcl%*mk%?cp%)
4350 IF N%<cp%:PROCgoup:ELSE:PROCgodn
4360 PROCbar(cp%,ccl% OR mcl%*mk%?cp%)
4370 ENDPROC
4380 :
4390 DEF PROCgoup
4400 FOR I%=1 TO cp%-N%
4410 PROCup
4420 NEXT:ENDPROC
4430 :
4440 DEF PROCgodn
4450 FOR I%=1 TO N%-cp%
4460 PROCdown
4470 NEXT:ENDPROC
4480 :
4490 DEF PROCshift(st%,end%,V%,Z%)
4500 mk%?st%=0
4510 R%=FNtodir(st%)
4520 IF R%=end%:ENDPROC
4530 PROCselect(R%)
4540 n$=nm$(st%)
4550 xd$=FNxst(R%,end%)+"."+n$
4560 ac%=acc%?st%
```

Continued▶

◀ New Order, listing 1 continued

```
4570 IF ac% AND 8:PROCoscli("ACCESS "+n$)
4580 PROCoscli("RENAME "+n$+" "+xd$)
4590 IF ac% AND 8:PROCoscli("ACCESS "+xd$+" "+FNacst(ac%))
4600 dst%=FNfind(nm$(st%),end%,V%)
4610 diff%=dp%?end%-dp%?R%
4620 IF dst%>st%:PROCshdn(st%,dst%,Z%):dst%=dst%-Z%:ELSE:PROCshup(dst%,st%,Z%)
4630 FOR I%=dst% TO dst%+Z%-1
4640 dp%?I%=dp%?I%+diff%
4650 NEXT
4660 ENDPROC
4670 :
4680 DEF FNfind(n$,R%,V%)
4690 LOCAL N%,D%
4700 S$=FNcap(n$)
4710 N%=R%:D%=dp%?R%
4720 REPEAT
4730 N%=N%+1
4740 UNTIL FNthere
4750 =N%
4760 :
4770 DEF FNthere
4780 IF N%>last% OR dp%?N%<=D%:=TRUE
4790 IF dp%?N%>D%+1:=FALSE
4800 IF V% AND dfl%?N%=0:=FALSE
4810 IF NOT V% AND dfl%?N%:=TRUE
4820 IF NOT V% AND S$<FNcap(nm$(N%)):=TRUE
4830 IF V% AND S$>FNcap(nm$(N%)):=TRUE
4840 =FALSE
4850 :
4860 DEF PROCshdn(F%,L%,Z%)
4870 FOR I%=1 TO Z%
4880 PROCrotup(F%,L%-1)
4890 NEXT
4900 ENDPROC
4910 :
4920 DEF PROCrotup(F%,L%)
4930 LOCAL N%
4940 PROCkeep(F%)
4950 FOR N%=F% TO L%-1
4960 nm$(N%)=nm$(N%+1)
4970 dp%?N%=dp%?(N%+1)
4980 acc%?N%=acc%?(N%+1)
4990 dfl%?N%=dfl%?(N%+1)
5000 mk%?N%=mk%?(N%+1)
5010 NEXT
5020 PROCfetch(L%)
5030 IF rct%>=F% AND rct%<=L%:rct%=rct%-1
5040 IF cp%>=F% AND cp%<=L%:cp%=cp%-1
5050 ENDPROC
5060 :
5070 DEF PROCkeep(N%)
5080 kpn$=nm$(N%)
5090 kpd%=dp%?N%:kpf%=dfl%?N%
5100 kpa%=acc%?N%:kpm%=mk%?N%
5110 ENDPROC
5120 :
5130 DEF PROCfetch(N%)
5140 nm$(N%)=kpn$
5150 dp%?N%=kpd%:dfl%?N%=kpf%
5160 acc%?N%=kpa%:mk%?N%=kpm%
5170 ENDPROC
5180 :
5190 DEF PROCshup(F%,L%,Z%)
5200 FOR I%=0 TO Z%-1
5210 PROCrotdn(F%+I%,L%+I%)
5220 NEXT
5230 ENDPROC
5240 :
5250 DEF PROCrotdn(F%,L%)
5260 LOCAL N%
5270 PROCkeep(L%)
5280 FOR N%=L%-1 TO F% STEP -1
5290 nm$(N%+1)=nm$(N%)
5300 dp%?(N%+1)=dp%?N%
5310 acc%?(N%+1)=acc%?N%
5320 dfl%?(N%+1)=dfl%?N%
5330 mk%?(N%+1)=mk%?N%
5340 NEXT
5350 PROCfetch(F%)
5360 IF rct%>=F% AND rct%<=L%:rct%=rct%+1
5370 IF cp%>=F% AND cp%<=L%:cp%=cp%+1
5380 ENDPROC
5390 :
5400 DEF PROCdirmove
5410 J%=0
5420 FOR N%=0 TO last%
5430 IF mk%?N%:J%=J%+1:R%=N%
5440 NEXT
5450 IF J%=0:PROCbad("No directory marked"):ENDPROC
5460 IF J%>1:PROCbad("More than one mark set"):ENDPROC
5470 IF dfl%?R%=0:PROCbad("Only use with directories"):ENDPROC
5480 IF dfl%?cp%=0:PROCbad("Directory not selected"):ENDPROC
5490 Z%=FNsize(R%)
5500 IF cp%>=R% AND cp%<R%+Z%:PROCbad("Can't move to within self"):ENDPROC
5510 PROCshift(R%,cp%,TRUE,Z%)
5520 PROCdisplay
5530 ENDPROC
5540 :
5550 DEF FNsize(R%)
5560 N%=R%:D%=dp%?N%
5570 REPEAT
5580 N%=N%+1
5590 UNTIL dp%?N%<=D% OR N%>last%
5600 =N%-R%
5610 :
5620 DEF PROCrename
5630 IF cp%=0:PROCbad("Can't RENAME root directory"):ENDPROC
5640 ac%=acc%?cp%
5650 IF ac% AND 4:PROCbad("Can't RENAME 'Execute only' file"):ENDPROC
5660 PRINT CHR$131;"Enter new name:";CHR$135;
5670 INPUT ""n$
5680 IF n$="":ENDPROC
5690 IF INSTR(n$,"."):PROCbad("Use (DIR)MOVE to change directory"):ENDPROC
5700 PROCseldir(cp%)
5710 IF ac% AND &C:PROCoscli("ACCESS "+nm$(cp%)):IF ac%=4:ac%=&C
5720 PROCoscli("RENAME "+nm$(cp%)+" "+n$)
5730 IF ac% AND 8:PROCoscli("ACCESS "+n$+" "+FNacst(ac%))
5740 IF dfl%?cp%:V%=TRUE:Z%=FNsize(cp%):ELSE:V%=FALSE:Z%=1
5750 dst%=FNfind(n$,FNtodir(cp%),V%)
5760 IF dst%=cp% OR dst%=cp%+Z%:nm$(cp%)=n$:PROCdisplay:ENDPROC
5770 IF dst%>cp%:PROCshdn(cp%,dst%,Z%):cp%=dst%-Z%:ELSE:PROCshup(dst%,cp%,Z%):cp%=dst%
5780 nm$(cp%)=n$
5790 PROCdisplay
5800 ENDPROC
```

Continued ▶

ADFS

◀ New Order, listing 1 continued

```
5810 :
5820 DEF PROCcdir
5830 IF last%=max%:PROCbad("No room"):ENDPROC
5840 IF dfl%?cp%=0:PROCbad("Directory not selected"):ENDPROC
5850 PRINT CHR$131;"Enter name:";CHR$135;
5860 INPUT ""n$
5870 IF n$="":ENDPROC
5880 IF INSTR(n$,"."):PROCbad("Only create in this directory"):ENDPROC
5890 IF LEN(n$)>10:PROCbad("Name too long"):ENDPROC
5900 PROCselect(cp%)
5910 PROCoscli("CDIR "+n$)
5920 dst%=FNfind(n$,cp%,TRUE)
5930 PROCrotdn(dst%,last%+1)
5940 nm$(dst%)=n$
5950 dp%?dst%=dp%?cp%+1
5960 acc%?dst%=9
5970 dfl%?dst%=1
5980 mk%?dst%=0
5990 last%=last%+1
6000 cp%=dst%
6010 PROCdisplay
6020 ENDPROC
6030 :
6040 DEF PROCdelete
6050 IF cp%=0:PROCbad("Can't DELETE root directory"):ENDPROC
6060 IF cp%<last%:IF dp%?(cp%+1)>dp%?cp%:PROCbad("Non-empty directory"):ENDPROC
6070 IF (acc%?cp%)AND&C:IF NOT FNsure("Locked."):ENDPROC
6080 PROCremove(cp%)
6090 PROCdisplay
6100 ENDPROC
6110 :
6120 DEF FNsure(S$)
6130 VDU 7,131:PRINT S$;" Are you sure? ";CHR$135;
6140 REPEAT:K$=GET$:UNTIL INSTR("YyNn",K$)>0
6150 PRINT K$
6160 IF INSTR("YyNn",K$)<3:=TRUE:ELSE:=FALSE
6170 :
6180 DEF PROCremove(N%)
6190 PROCseldir(N%)
6200 IF (acc%?N%)AND&C:PROCoscli("ACCESS "+nm$(N%))
6210 PROCoscli("DELETE "+nm$(N%))
6220 PROCrotup(N%,last%)
6230 last%=last%-1
6240 ENDPROC
6250 :
6260 DEF PROCwipe
6270 IF NOT FNcheck("WIPE"):ENDPROC
6280 IF NOT FNsure("Destroy marked files."):ENDPROC
6290 FOR N%=last% TO 0 STEP -1
6300 IF mk%?N%:PROCremove(N%)
6310 NEXT
6320 PROCdisplay
6330 ENDPROC
6340 :
6350 DEF PROCkill
6360 IF cp%=0:PROCbad("Can't KILL root directory"):ENDPROC
6370 IF dfl%?cp%=0:PROCbad("Directory not selected"):ENDPROC
6380 IF NOT FNsure("Destroy directory."):ENDPROC
6390 D%=dp%?cp%:N%=cp%
6400 REPEAT
6410 N%=N%+1
6420 UNTIL dp%?N%<=D% OR N%>last%
6430 FOR M%=N%-1 TO cp% STEP -1
6440 PROCremove(M%)
6450 NEXT
6460 PROCdisplay
6470 ENDPROC
6480 :
6490 DEF PROCannih
6500 IF last%=0:PROCbad("Empty disc"):ENDPROC
6510 IF NOT FNsure("Destroy everything."):ENDPROC
6520 FOR N%=last% TO 1 STEP -1
6530 PROCremove(N%)
6540 NEXT
6550 PROCdisplay
6560 ENDPROC
6570 :
6580 DEF PROCquit
6590 PROCselect(cp%)
6600 VDU 26,12
6610 PROCend
6620 :
6630 DEF PROCend
6640 VDU 23,1,1;0;0;0;
6650 *FX 4
6660 *FX 200
6670 END
6680 :
6690 DEF PROCexit
6700 PROCselect(cp%)
6710 VDU 26,12
6720 FOR I%=4 TO 24
6730 VDU 31,0,I%,152
6740 NEXT
6750 VDU 23,1,0;0;0;0;
6760 CLEAR
6770 DIM cliblk% 15
6780 clih%=cliblk% DIV 256
6790 J%=1
6800 REPEAT
6810 V%=FNcompacted
6820 IF NOT V%:PROCcompact
6830 UNTIL V%
6840 VDU 28,0,24,39,4,12,26
6850 VDU 31,2,5,131
6860 PRINT "Disc fully compacted"'
6870 PROCend
6880 :
6890 DEF FNcompacted
6900 VDU 28,1,24,39,4,30
6910 *MAP
6920 =VPOS<3
6930 :
6940 DEF PROCcompact
6950 VDU 28,0,4,39,0
6960 FOR I%=0 TO 1
6970 VDU 31,7,I%,141,132,157,131
6980 PRINT "Compacting disc  ";CHR$156
6990 NEXT
7000 PRINT 'CHR$130;SPC(2);"Compaction number ";J%;" in progress";
7010 J%=J%+1
7020 PROCoscli("COMPACT "+STR$~((TOP DIV 256)+2)+" "+STR$~(((HIMEM-TOP)DIV 256)-3))
7030 ENDPROC
7040 :
7050 DEF PROChelp
```

Continued ▶

◀ New Order, listing 1 continued

```
7060 VDU 26,12
7070 PROCheading(0)
7080 PRINT''CHR$129;"Available commands:"
7090 FOR I%=4 TO 6:VDU 31,0,I%,130:NEXT
7100 VDU 28,2,24,39,4,30
7110 PROChln("<arrows>","Move cursor","")
7120 PROChln("<COPY>","Mark at cursor (on/off)","")
7130 PROChln("<TAB>","Access codes (on/off)","")
7140 PROChln("DELETE","Delete file or directory","at cursor")
7150 PROChln("WIPE","Delete marked files","")
7160 PROChln("KILL","Delete a directory","")
7170 PROChln("ANNIHILATE","Delete everything","")
7180 PROChln("CDIR","Create a directory","")
7190 PROChln("MOVE","Move all marked files to","directory at cursor")
7200 PROChln("DIRMOVE","Move a directory","")
7210 PROChln("RENAME","Rename a file or","directory")
7220 PROChln("ACCESS","Change access codes","")
7230 PROChln("CLEAR","Remove all marks","")
7240 PROChln("QUIT","Quit immediately","")
7250 PROChln("EXIT","Compact and quit","")
7260 PROChln("HELP","Display commands","")
7270 VDU 26,31,5,24,131
7280 PRINT "(Press a key to continue)";
7290 *FX 15
7300 K%=GET:CLS
7310 PROCdisplay
7320 ENDPROC
7330 :
7340 DEF PROChln(K$,S$,T$)
7350 PRINT K$;TAB(10);CHR$134"- ";S$
7360 IF T$>"":PRINT TAB(14);CHR$134;T$
7370 ENDPROC
7380 :
7390 DEF PROCbad(S$)
7400 PROCcmwind
7410 VDU 31,0,22-wsz%,7,129:PRINT S$
7420 ENDPROC
7430 :
7440 DEF PROCerror
7450 VDU 7,26,31,0,24,129
7460 VDU 28,1,24,39,24,12
7470 REPORT:PRINT
7480 PROCcmwind:VDU 31,0,22-wsz%,10
7490 ENDPROC
>
```


See Ripple, Page 89

Listing 1. Ripple

```
10 REM Ripple
20 REM Animated rippled surface
30 REM Version  B 2.8
40 REM by Michael Attenborough
50 REM Arc with RISC OS only
60 REM (C) BAU
70 :
80 PROCinit1
90 PROCoptions
100 IF load% THEN
110 PROCload
120 ELSE
130 PROCinit2
140 PROCcreate
150 PROCsave
160 ENDIF
170 PROCanimate
180 END
190 :
200 DEF PROCinit1
210 MODE 9
220 FOR C%=0 TO 15:COLOUR C%,C%*16,C%*16,C%*16:NEXT
230 COLOUR 15
240 ON ERROR GOTO 1510
250 ENDPROC
260 :
270 DEF PROCoptions
280 PRINT''SPC(13);"RIPPLE"
290 PRINT SPC(13);"======"
300 PRINT'''"Load sprites from disk? (Y/N)";:A$=GET$
310 load%=(A$="Y" OR A$="y"):PRINT
320 IF load% THEN ENDPROC
330 INPUT'"No. of squares on each side (default=80)";squares%
340 IF squares%=0 THEN squares%=80
350 DIM max% -1
360 max%=(HIMEM-max%-1000) DIV 32944
370 PRINT"No. of frames (default=";max%;:INPUT;")";frames%
380 IF frames%<1 THEN frames%=max%
390 ENDPROC
400 :
410 DEF PROCload
420 *CAT
430 REPEAT
440 INPUT"Sprite file name";F$
450 IF F$="" F$="Sprites"
460 C%=OPENIN(F$)
470 IF C%=0 THEN PRINT"I can't find that file."
480 UNTIL C%<>0
490 space=EXT#C%+32
500 CLOSE#C%
510 PROCinitsprites
520 SYS "Hourglass_On"
530 SYS "OS_SpriteOp",10+256,spr,F$
540 SYS "Hourglass_Off"
550 SYS "OS_SpriteOp",8+256,spr TO ,,,frames%
560 ENDPROC
570 :
580 DEF PROCinit2
590 PROC3Dinit:PROCrot(SIN(RAD(35))*2000,COS(RAD(35))*2000,3000)
600 sqs%=squares% DIV 2
610 squares%=sqs%*2
620 percent=0:perinc=99/((squares%+1)*frames%)
630 step=1200/squares%
640 astep=360/frames%
650 space=frames%*32944+300
660 visc=1/600:REM viscosity: sets how fast waves die out.  With this value, a wave of amplitude 1 reaches 600 units before dying out.
670 wl=360/200:REM wavelength: This value gives a wavelength of 200 units
680 PROCinitsprites
690 ENDPROC
700 :
710 DEF PROCinitsprites
720 REM check room for sprites
730 LOCAL ERROR
740 ON ERROR LOCAL PRINT"Not enough room for sprites":END
750 DIM spr space
760 RESTORE ERROR
770 !spr=space:spr!4=0:spr!8=16:spr!12=16
780 ENDPROC
790 :
800 DEF PROCcreate
810 SYS "Hourglass_On"
820 ORIGIN 593,581:MOUSE TO -418,277
830 FOR S%=0 TO frames%-1
840 CLS:PROCborder:ORIGIN 593,581
850 FOR X=-sqs%-1 TO sqs%
860 SYS "Hourglass_Percentage",percent
870 percent+=perinc
880 FOR Y=sqs% TO -sqs% STEP-1
890 ZA%=FNz(X,Y):PROC3D(X*step,Y*step,ZA%,XA%,YA%)
900 ZB%=FNz(X+1,Y):PROC3D((X+1)*step,Y*step,ZB%,XB%,YB%)
910 ZC%=FNz(X,Y+1):PROC3D(X*step,(Y+1)*step,ZC%,XC%,YC%)
920 ZD%=FNz(X+1,Y+1):PROC3D((X+1)*step,(Y+1)*step,ZD%,XD%,YD%)
930 C%=FNcol(XA%,YA%,ZA%,XB%,YB%,ZB%,XC%,YC%,ZC%)
940 C%+=FNcol(XD%,YD%,ZD%,XB%,YB%,ZB%,XC%,YC%,ZC%)
950 GCOL C% DIV 2:MOVE XA%,YA%:MOVE XB%,YB%:PLOT 85,XC%,YC%:PLOT 85,XD%,YD%
960 NEXT,
970 ORIGIN 0,0:SYS "OS_SpriteOp",16+256,spr,STR$(S%),0,43,43,1108,980
980 NEXT S%
990 SYS "Hourglass_Off"
1000 ENDPROC
1010 :
1020 DEF PROCsave
1030 CLS:ON
1040 PRINT'''"Save sprites to disk? (Y/N)";:A$=GET$
1050 IF A$<>"Y" AND  A$<>"y" THEN ENDPROC
1060 INPUT'"Sprite file name";F$
1070 IF F$="" F$="Sprites"
1080 SYS "Hourglass_On"
1090 SYS "OS_SpriteOp",12+256,spr,F$
1100 SYS "Hourglass_Off"
1110 ENDPROC
1120 :
1130 DEF PROCanimate
1140 PROCborder
1150 FOR C%=0 TO 15:COLOUR C%,C%*16,C%*16,C%*16:NEXT
1160 REPEAT
1170 FOR S%=frames%-1 TO 0 STEP -1
1180 WAIT:SYS "OS_SpriteOp",34+256,spr,STR$(S%),43,43,0
1190 PRINTTAB(0,0);"":REM This allows slowing with Ctrl or freezing with Scroll Lock.
1200 NEXT
1210 UNTIL FALSE
1220 ENDPROC
1230 :
1240 REM Wave source definitions: remove REM from the front of the one you want
1250 REM X and Y both go from -600 to 600
1260
1270 REM one wave in centre
1280 REMDEF FNz(X,Y):=FNwave(X,Y,0,0,0,3.5)
1290
1300 REM wave reflected from top left side
1310 REM set visc to 0 to cause standing wave
1320 REMDEF FNz(X,Y):=FNwave(X,Y,-400,0,0,2)+FNwave(X,Y,1600,0,0,2)
1330
1340 REM two interfering waves
1350 DEF FNz(X,Y):=FNwave(X,Y,400,-600,0,3)+FNwave(X,Y,-400,-600,0,3)
1360 :
1370 DEF FNwave(X,Y,XC%,YC%,phase,amp)
1380 LOCAL A:X=(X*step)+XC%:Y=(Y*step)+YC%
1390 D=SQR(X*X+Y*Y):A=amp-D*visc:IF A<0 THEN A=0
1400 =COS(RAD(D*wl+S%*astep+phase))*A*16
1410 :
1420 DEF PROCborder
1430 CLS:OFF:ORIGIN 0,0:GCOL 1
1440 RECTANGLE 0,0,1151,1023:RECTANGLE 43,43,1065,937
1450 LINE 0,0,43,43:LINE 1151,0,1108,43
1460 LINE 0,1023,43,980:LINE 1151,1023,1108,980
1470 GCOL 14:FILL 100,20:GCOL 10:FILL 1130,100
1480 GCOL 4:FILL 100,1003:GCOL 6:FILL 20,100
1490 GCOL 8:FILL 1278,100:VDU 19,0,24,128,128,128
1500 ENDPROC
1510 :
1520 ON ERROR OFF
1530 CLS:ON
1540 SYS "Hourglass_Smash"
1550 IF ERR=17 END ELSE REPORT:PRINT" at line ";ERL
1560 END
1570 :
1580 DEF PROC3Dinit
1590 rs=2000:rinf=3500:tanB=640/rs
1600 DIM Ry(2,2),Rz(2,2),X(2)
1610 DIM n(2),a(2),b(2),P(2),l(2)
1620 l(0)=2:l(1)=-1:l(2)=1:REM light direction vector
1630 l()=l()/MOD(l())
1640 Ry(1,1)=1:Rz(2,0)=1
1650 ENDPROC
1660 :
1670 DEF PROCrot(vx,vy,vz)
1680 LOCAL R,r
1690 R=SQR(vx*vx+vy*vy+vz*vz):r=SQR(vx*vx+vy*vy)
1700 Ry(0,2)=r/R:Ry(2,2)=vz/R:Ry(0,0)=-vz/R:Ry(2,0)=r/R
1710 Rz(0,2)=vx/r:Rz(1,2)=vy/r:Rz(0,1)=-vy/r:Rz(1,1)=vx/r
1720 ENDPROC
1730 :
1740 DEF PROC3D(X(2),X(1),X(0),RETURN X3%,RETURN Y3%)
1750 LOCAL A:X()=Rz().X():X()=Ry().X()
1760 A=640/(tanB*(rinf-X(2))):X3%=A*X(1):Y3%=A*X(0)
1770 ENDPROC
1780 :
1790 DEF FNcol(P(2),P(1),P(0),a(2),a(1),a(0),b(2),b(1),b(0))
1800 a()=a()-P():b()=b()-P():n(0)=a(1)*b(2)-a(2)*b(1)
1810 n(1)=a(2)*b(0)-a(0)*b(2):n(2)=a(0)*b(1)-a(1)*b(0):P()=n()*l()
1820 =ABS(SUM(P())/MOD(n()))*15
```

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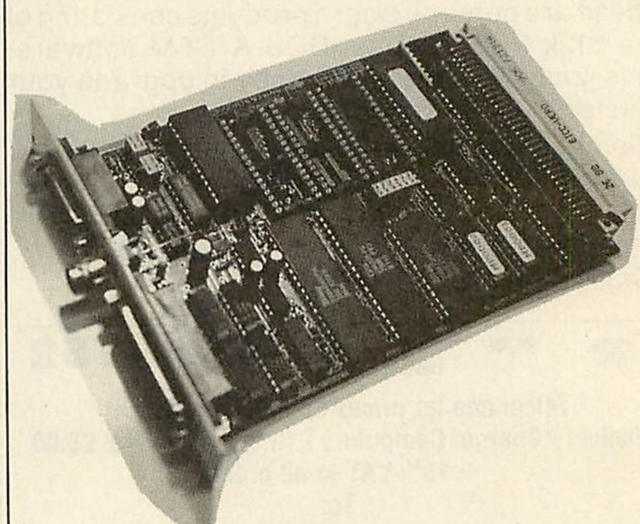
SOUND DIGITISER
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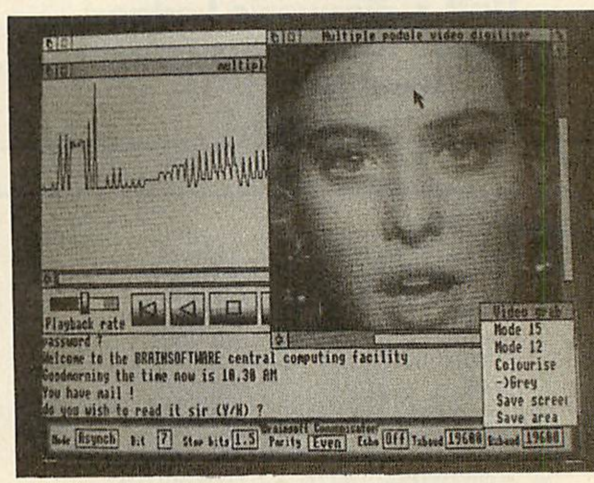
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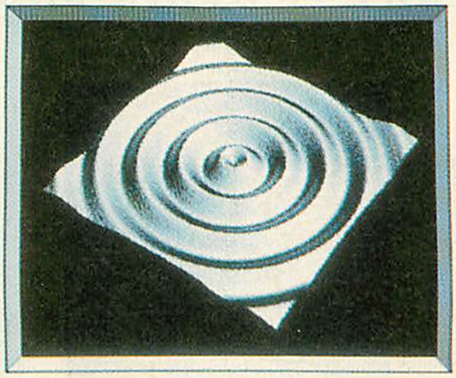
OFFERS

THIS MONTH'S LISTINGS

This month's disc begins on a musical note with a random tune generator, as well as the usual Interlude offerings.

Problems with ADFS? Then look no further than our ADFS Manager. Satellites get a look in with a program to find the optimum position for your dish.

Dave Acton squeezes more sound into his Arc with a sample compressor. (A collection of zaps, thwacks and kapows are included for your enjoyment.) Agora also



features sprite scaling and some hints on using *First Word Plus.*

Graphics make an appearance on the Arc with a relaxing Ripple generator. As an extra bonus to Arc users, a set of help sheets (in the form of Draw files) are provided to make life easier with Risc OS.

Finally, Hints & Tips includes the usual assortment of bits n' bobs with a screen compressor, disc menu and *Wordwise Plus* utilities.

Making the earth move

GAMES DISC

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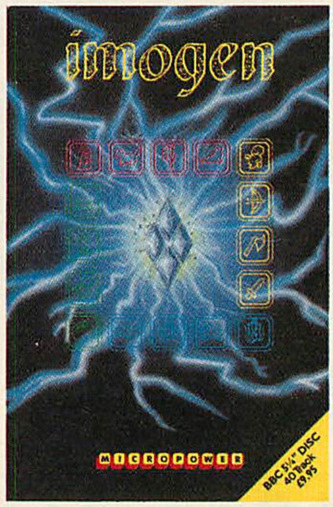
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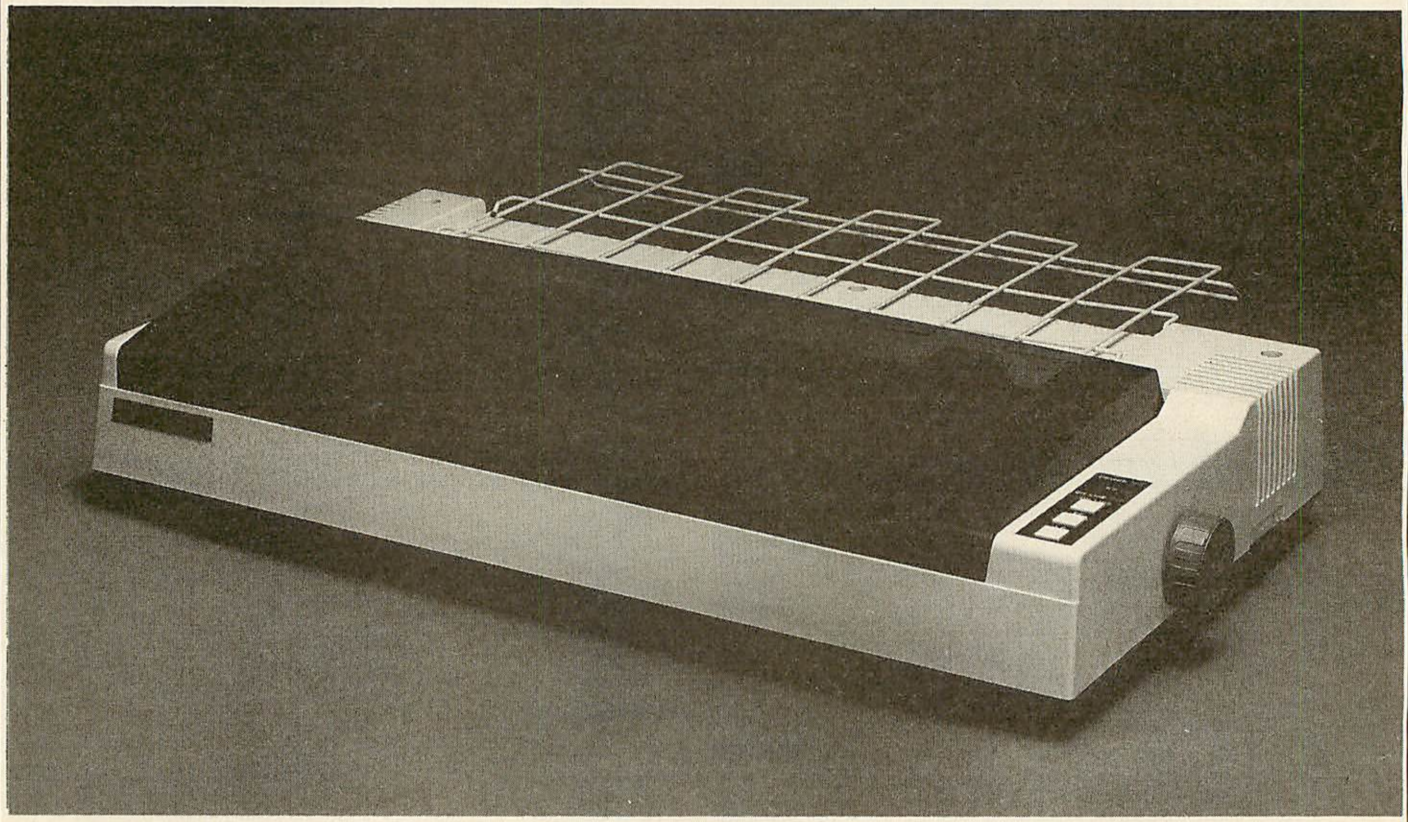
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STUDIO STYLE

Clive Grace looks at Studio 24 Plus, the package that may take the Arc into the MIDI market

Almost immediately after the launch of the Archimedes two years ago, Acorn said that with a MIDI interface, the Arc would offer unrivalled performance for music-making and a suitably equipped Archimedes could form the heart of a MIDI workstation.

Indeed, Acorn soon produced a MIDI podule and is shortly to do the same for the A3000. However, hardware is only as good as the software driving it and on the sequencing side, at least, EMR has taken the lead.

At last year's Frankfurt Music Fair, Acorn was the only computer exhibitor and the populist computer music guru Mike Beecher showed off EMR's new sequencing package *Studio 24 Plus*. Looking like a colourful ST package, it drew quite an interest from the crowds.

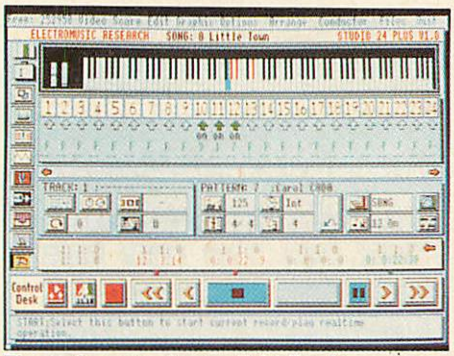
The software is a radical departure from anything EMR has produced before. It looks like all the best bits from the best packages running on the Atari ST and the Mac. EMR has cloned the front page of its software from packages like Steinberg's *Pro 24 Plus*, given it an environment compatible with Risc OS, and coloured everything up giving it a distinct advantage over the monochrome world of the Mac and the ST.

The software arrives as a 3.5in disc which can be installed without problems on to a hard drive if you want. It runs happily under Risc OS as well as the older Arthur operating system.

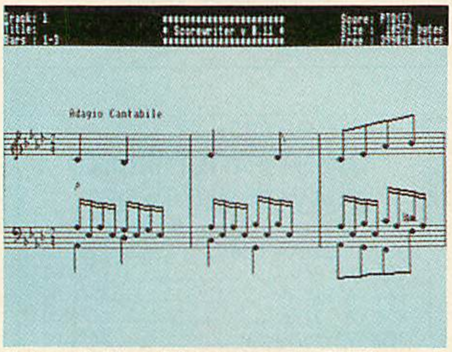
The software itself is operated from a main page, displaying all 24 tracks available to the user in one go.

Eleven icons running down the side of the main page enable users to edit waveforms, perform timekeeping, access internal samples (from the sampling package that hooks onto the sequencer and runs in a multi-program environment). This is the Icon bar.

The top line is the Menu Bar and is used for loading and saving files, for leaving the program and for setting up special options. This section of the software uses pull-down menus.



The main page shows all 24 Tracks and is under full icon control



Not available yet for review, but EMR's Scorewriter will be a useful add-on to Studio 24 Plus.

Initial recording

As with all new sequencers, a great deal of time is taken up learning how to use them. Things are a good deal easier than in the days of the BBC B's UMI 2B (and the much improved 4M) system, where one would have to learn how a piece of software actually worked. The EMR software is reasonably intuitive, with plenty of on-line help displayed on the bottom line of the main screen.

This makes the package almost 'manual free' for the first few hours of playtime.

Starting off with a reasonably simple rig, I hooked up a Roland MT-32 synthesiser and my trusty Akai X7000 sampling keyboard, also connected to a Macintosh. I was able to directly interface the Archimedes (with no cable swapping or re-networking) by simply using MIDI echo on mode from the Macintosh. This copies whatever MIDI information comes down the line.

A Studio 24 user is probably going to write faster once a basic framework has been laid down. Laying down a rhythm track followed by a bass track and then filling out the sound a bit with some choral samples seems to get things running quicker than by the 'drips and drabs' method of older sequencers such as UMI and the older BBC B versions of EMR's sequencers.

This approach tends to be more memory-intensive than the more structured approach but then memory is hardly something an Archimedes owner need worry about.

Recording always starts on Track One of Pattern One by default, although this can be changed. Ever looking for the easy life, I found it was best to set up the MIDI interface so Track One relates to MIDI Channel One, Channel Two to MIDI Channel Two and so on. With the MT-32 connected up, the drum track was configured for track 16 followed by the sampler occupying tracks 17 onwards (depending on how many samples were loaded at the time).

The process of recording is remarkably simple, just click on the Record button, wait for the count-in and then play some music.

The count-in is via the keyboard on MIDI Channel One. It's possible to have a sample triggered from the internal sound system of the Archimedes but this tends to get a little drowned out when the synths are in full swing!

Any drum machines connected to the sequencer (other than the one built into a synth such as the MT-32) should be set to 'External MIDI clock timing', as is necessary with most sequencers.

Recording is at a high resolution. The actual PPQ rate is not given but I suspect it's quite a bit higher than the popular sequencers on the Atari ST such as Steinberg's *Pro 24 Plus*.

Certainly, I found *Studio 24 Plus* more responsive overall than the 'new generation' of sequencers such as *Cubit* and MasterTrack's *Pro*.

Most, if not all, of the major compo-

sition and MIDI track re-routing work is performed in front of the main screen. This would have been a confusing mess on monochrome software but EMR has made clever use of the Arc's colours to make each button and icon contrast against the rest.

One particularly useful feature is the thin baton-shaped pointer. This is more than an aesthetic nicety. Many mouse pointers are chunky and unwieldy. Why use a mouse and pointer if the pointer itself covers the whole icon?

The screen is split into four separate sections, The Menu Bar, the Display Window, the Track Window and the Control Desk. These are all placed roughly across the screen in quarters. The mouse interface provides fast access and no jerkiness when the disk is accessed.

The Display Window looks a treat. The digital volume (VU) meter has a peaking bar line for every instrument on the 24 track patch bay so when a key is hit, the VU meter will peak, hit the keyboard a bit harder and it peaks higher.

A nice feature is that the peaking meters can be replaced by a piano, giving an accurate description of what keys are pressed on the keyboard. This is particularly useful if you are playing drums on the keyboard and need to find out which key is being used to trigger each instrument sound.

The 24 tracks are each accompanied by a disabling switch. This enables you to break a song down into its component parts at the playback stage – great for on the spot mixing and experimentation and very useful should you only need to want to record one track at a time.

The MIDI Channel can be redirected at any point in a song – dead useful if you want to keep a small rig up and running or if you want to access different sounds elsewhere on the rig.

Situated just below the ribbon bar are the track and the pattern windows. These act as pointers to the sounds and the patterns in the song you have recorded. There are options to quantise your music as well as alter the count-in period, or even to send a MIDI reset if the system gets in a jam from some instrument or other going AWOL.

The Track Window lets you select internal and external sounds, as well as a selection of preset patterns and sounds. You can also transpose instruments to play any offset from the rest of the music. It's possible, for example, to have a keyboard playing at thirds to the bass, if you should want to.

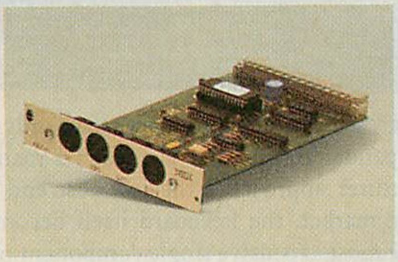
The control desk is just a faithful recreation of the 'tape machine' buttons and one feature I found very useful is the ability to 'punch in' a section of music.

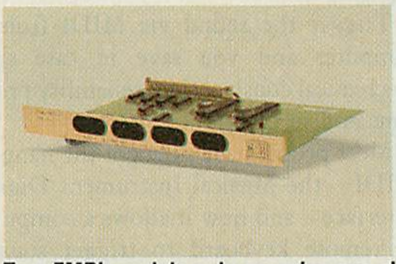
If you make a slight mistake on an otherwise great take, simply setting the sequencer into 'punch mode' enables you to play over and wipe out the bum section and try again, and again, and again.

The clipboard lets you cut and paste whole sections of music from one section of a song to another. The number of cuts are noted and displayed as part of the icon. This is a 'Last in, First Out' clipboard so you will have to cycle through them (and make a note of what they are) if you want to paste many chunks of a song. Some way of noting what the cuts were (perhaps by giving each a name) would be useful.

There is no provision to 'time slice' the cuts together so cuts on a half beat are properly linked but the clipboard is nevertheless invaluable.

MIDI INTERFACES





Top: EMR's podule only occupies one slot
Bottom: Acorn podule saves on space

There are, at the moment, only two MIDI podules to add to your Arc — from EMR and Acorn. The EMR podule offers four MIDI ins and four MIDI outs. It is just about as large as a two slot backplane but only occupies a single slot.

The board is put on its side, as it were, allowing for only one other podule on a 305 or 310 and just two on a 400 series machine. At present there is no way the EMR Podule can be used on an A3000 as the podule space is not large enough although EMR is working on this.

The Acorn Podule is a little more conservative of podule space. It occupies a single slot but offers just one MIDI in, two parallel outs and a thru.

A MIDI interface is a MIDI interface, and EMR's is far better specified for Archimedes 300 and 400 users although it takes up a goodly amount of space.

There is also quite a bit of heat coming out from under a A400 these days. If you plan on taking the system anywhere outside of your bedroom (on stage perhaps) then you should fit a fan.

Finale

The package in general performs well. The learning curve is sufficiently shallow for me to recommend *Studio's* use in recording studios that haven't yet taken the plunge for a system running on another machine.

However, as a professional tool, I am still not completely convinced that this is the right approach to sequencing, as it may not afford the control many pros like to have. However, *Studio 24 Plus Version 2* should take care of that.

For schools, *Studio 24 Plus* and the rest of EMR's *Arpeggio* music system should prove invaluable.

For the home user, *Studio 24 Plus* is a very comprehensive package, offering a great deal for the first-time user.

I put the software up against two competing sequencers, the Steinberg *Pro 24 Plus* for the Atari ST and DR T's *KCS* sequencer (also, ostensibly for the Atari ST but for the Macintosh as well) and I felt that EMR's package was superior in many ways.

On-screen presentation was reasonably clear and the use of colour excellent (monochrome Arc users will have to take the plunge and get a colour monitor).

The sequencer is accurate, easy to use and quick to appeal. There are obvious signs that EMR has made use of the Arc's speed and power but there were sadly a few 'points lost' concerning documentation. I found the manual a little unclear on a few points.

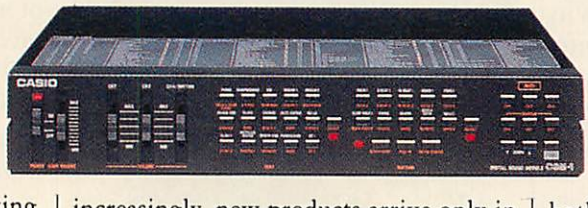
This is a shame because on a performance level, *Studio 24 Plus* can now take the established music computers and beat them on their own ground.

Studio 24 Plus: *£99 from Electromusic Research, 14 Mount Close, Wickford, Essex SS11 8HG. Tel: (0702) 335747.*



MIDI MAGIC

The world of synthesised music is a non-stop party with new innovations arriving all the time says Jez Ford



Year after year the electronic music market seems to undergo another 'revolution'. There's non-stop party going on out there. The world of synthesised music is forever being swept off its feet – and at the moment much of the wind is blowing from the direction of computer music.

Hordes of musicians are turning to computers for recording and composition. Similarly, computer users are investing in music software and sound expanders, even when their musical prowess extends no further than *Three Blind Mice*.

The reason for the take-off in music computing is simple. It has become cheap. This year has seen the keyboardless MIDI sound expander emerge from the shadows and enter the spotlight, no longer merely the lesser brother but a market leader in its own right.

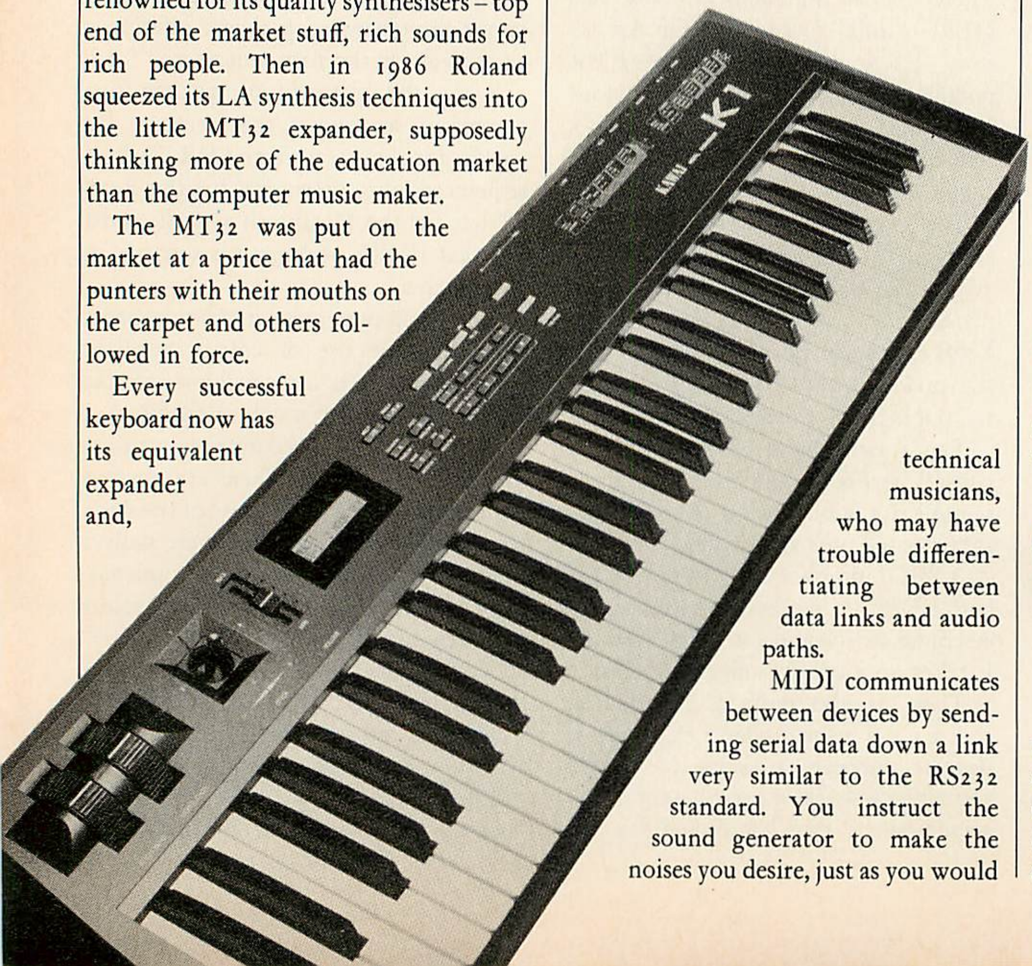
Take Roland for example. Roland is renowned for its quality synthesisers – top end of the market stuff, rich sounds for rich people. Then in 1986 Roland squeezed its LA synthesis techniques into the little MT32 expander, supposedly thinking more of the education market than the computer music maker.

The MT32 was put on the market at a price that had the punters with their mouths on the carpet and others followed in force.

Every successful keyboard now has its equivalent expander and, increasingly, new products arrive only in expander form. After all, when a manufacturer approaches the low-cost end of the market, the keyboard itself becomes the most expensive single component of a synthesiser.

Trigger the sound via MIDI from a computer and you save in case size, mechanical construction, reliability problems and so on.

Most people have now got the hang of MIDI – the Musical Instrument Digital Interface – and how it allows a computer or remote keyboard to trigger sounds from an expander. If you haven't, you'll be happy to know that it's easier for computer users to grasp than for non-technical musicians, who may have trouble differentiating between data links and audio paths.



MIDI communicates between devices by sending serial data down a link very similar to the RS232 standard. You instruct the sound generator to make the noises you desire, just as you would control the computer's internal sound chip.

So MIDI transforms music making into a process of bulk data manipulation. No surprise then that the computer has taken over, and both Beebs and Arcs fare well.

The biggest problem when you decide to take your computer into the MIDI music age is what to buy and how to choose. In the old days you could wander into your local music shop, run your fingers over everything there and buy the nicest sounding sausage you could afford.

These days however, much of the power of synths and expanders is hidden in the instrument's MIDI specification.

Although MIDI is standardised between manufacturers and software companies, the complete set of possible MIDI instructions is huge and few (if any) synthesisers will include everything. This means you have to be careful to check for glaring omissions.

For example Yamaha's EMT-10 expander, an excellent unit with some brilliant piano and choir samples, totally ignores basic commands such as pitchbend and modulation. Other units will react to such commands but will not, say, allow any variation in the range of pitchbend or the severity of modulation.

To avoid disappointment, you need to test a prospective purchase as fully as possible via MIDI from a master keyboard. Better still break open the owner's manual which will often have a chart of the MIDI operations possible.



The next vital ingredient for computer users to look for is multitimbral operation. Until recently, a synthesiser was dedicated to producing one type of sound (timbre) at once or a piano or a string sound say, but not both at the same time.

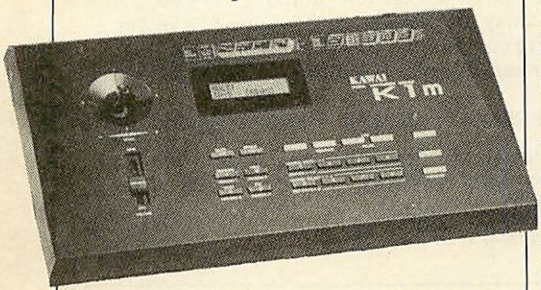


As techniques improved, and particularly as synthesis went digital, it became possible for several types of sound to be layered over each other.

Using MIDI, a computer is able to send different sets of instructions for each type of sound. Each MIDI instruction starts with a channel number so that piano sounds can be set to react only to, say, a channel one instruction and strings only to channel two.

With eight or 16 multitimbral specification the results can be spectacular.

But beware! Hand in hand with multitimbral specification comes the



amount of polyphony available. The polyphony figure simply tells you how many notes can be played at once by a synthesiser. Obviously this sets the limits on multitimbral operation. If eight channels of multitimbral operation are available but accompanied by only eight note polyphony, then each timbre can only play a single note at a time. That may be fine for bass and lead sounds but piano parts may well suffer severe problems.

Thankfully, the somewhat constraining days of eight-note polyphony are on the way out, particularly with units designed specifically for computer use. Roland's new range of sound modules combines the best of its successful MT32 and U110 expanders.

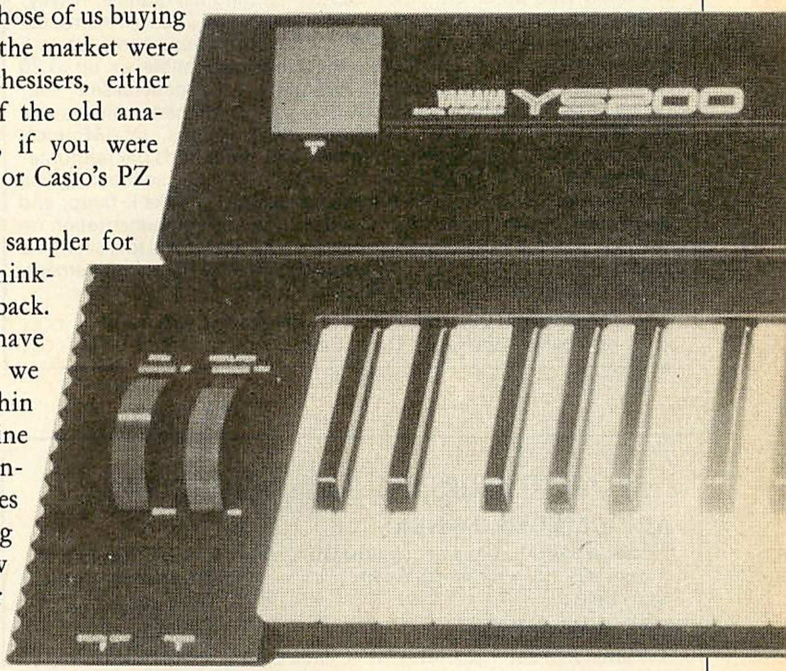
The flagship CM-64 (for £789) offers 15-channel multitimbral operation combined with a whacking 63-note polyphony, a pretty powerful combination that could easily prove more than a match for the MIDI standard itself.

Noises off

Of course all this multitimbral megapower is about as much use as a chocolate heatsink if the expander's sounds are rotten in the first place. You cannot choose by specs alone and when it comes down to it, a smallish number of quality voices is an awful lot more useful than reams of rubbish.

Synthesis is obviously a dreadfully complicated business. Until recently, the only option open to those of us buying at the budget end of the market were straight digital synthesisers, either digital equivalents of the old analogue techniques or, if you were lucky, Yamaha's FM or Casio's PZ synthesis techniques.

Getting hold of a sampler for under £500 was unthinkable just a few years back. Now we not only have samplers available, we have synthesisers within our reach that combine both sampling and synthesis, taking samples and then applying conventional and new techniques to their manipulation.



Kawai's K1r expander (£435) is one of these, producing some spectacular ethereal voices from choir and string samples. Adding £150 to the price will get you the original K1 with its velocity sensitive keyboard.

At the British Music Fair in July, Kawai unveiled a whole range of budget preset keyboards using the same technology. The PH-50 (£200) is the best value with 200 of the best K1 sounds and PCM sampled percussion. The PHM (£276) is the expander equivalent.

The D5 from Roland (£599 with keyboard) looks set to challenge the success Kawai has been enjoying with the K1 and friends. Similar in specification, it beats the K1 (and equals the K1 MkII) with its selection of percussion samples that wipes out the need to get a separate drum machine.

Together with the computer-aimed expanders (the £369 CM32L and £445 CM32P) these should ensure Roland has a healthy year.

Yamaha continues its line of FM racks and synths but is beginning to look tired in the face of all this opposition.

The 'portable keyboard' (that is, the home amateur) division, although separate from its pro-market products, is however producing an interesting selection of expanders which look pretty impressive in a computer setup.

The EMT-10 (£250) has a selection of excellent AWM (advanced Wave Memory) samples but falls flat on multitimbriality. The new AVS10 (£399) has three channels of multitimbral operation and 12 impeccable AWM sounds.

Also, check out Yamaha's new DAS system – a combination of FM and AWM.

The EMT-1 (£180) has a collection of reasonable FM presets and the EMT-10 (£250) a selection of excellent samples. Both fall flat on multitimbrality because of the market they're aimed at, but for the price the sounds are fine.

Casio seems to have noticed the possibilities of such units in professional circles and has produced two expanders with names remarkably similar – the CSM-1 (£200) with present voices and rhythm and the CSM-10P (£249) with sampled



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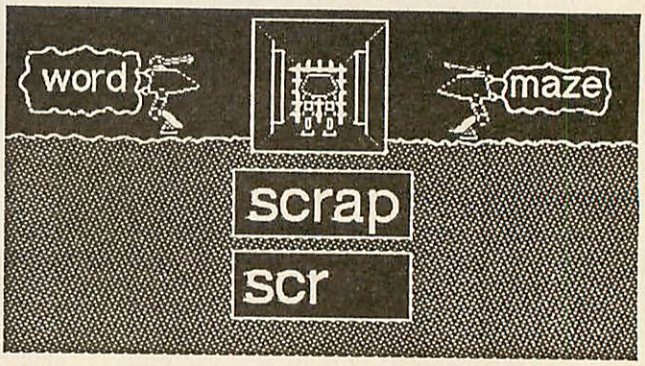
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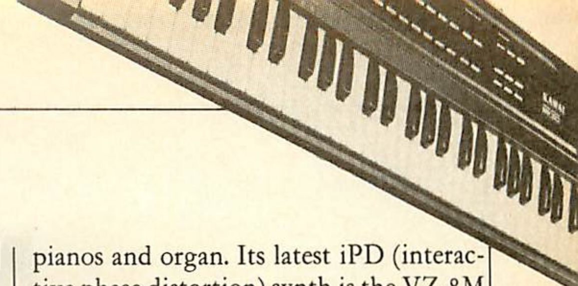
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Kawai MS-710	£148	miniature 49-key drum pads	10-voice 20 preset 4 prog	5	yes	19 (PCM) 24 preset	real time sequencer pitch bend stereo chorus
Yamaha emt-1	£180	expander only	8-voice 32 preset (FM)	4			
Casio CSM-1	£200	expander only	16-voice 28 preset	4		72 (PCM) 20 preset	
Casio MT-740	£200	miniature	10-voice 30 preset & tonebank			49 (PCM) 20 preset	real time sequencer
Yamaha PSS780	£200	miniature 61-key	10-voice 100 preset (FM) 5 prog	5		100 preset	sequencer
Casio CT-640	£249	full size 61-key	10-voice 30 presets & tonebank			49 (PCM) 20 presets	real time sequencer stereo
Casio CSM-10P	£250	expander only	16-voice 5 preset				
Yamaha EMT-10	£260	expander only	8-voice 120 preset (AVM)				
Kawai PHM	£276	expander only	16-voice 200 preset 50 combinations	4		PCM 30 preset	stereo
Casio HT-700	£299	miniature 49-key	8-voice 20 preset 20 Ram card	out only	yes	15 (PCM) 20 preset 10 Ram card	pitch bend sequencer
Kawai PH50	£299	mid size 49-key	16-voice 200 preset 50 combinations	4		PCM 30 preset	pitchbend, vibrato forte stereo
Kawai WK50	£299	mid size 61-key	12-voice 48 preset	7		PCM 32 preset	multi-function joystick sequencer
Yamaha YS100	£349	full-size 61-key velocity	8-voice 100 prog (FM) Ram card	8	yes		10 digital effects
Roland CM-32L	£369	expander	32-voice 128 preset (LA)	9		30 (LA) 33 sound FX	digital reverb
Yamaha PSR-47	£370	full-size 61-key drum pads	8-voice 100 preset (DAS)			PCM 100 preset	pitch bend sound FX
Kawai K1M	£395	expander only	16-voice 96 prog Ram expansion	8	yes	percussion samples	
Casio CPS700	£399	full size 61-key velocity	16-voice 5 preset				piano module 12-bit sampling
Yamaha AVS-10	£399	expander only	16-voice 12 preset (AVM)	3			reverb
Casio HT-3000	£429	full size 61-key	8-voice 30 preset 30 Ram card	3	yes	15 (PCM) 10 Ram card 20 preset	pitch bend modulation
Kawai K1R	£435	expander only	16-voice 96 prog Ram expansion	8	yes	percussion samples	
Roland CM-32P	£445	expander	31-voice 64 preset (PCM) card expansion	6			digital reverb
Yamaha DX-11	£449	full-size 61-key	8-voice 128 preset (FM)		yes		
Yamaha TQ5	£449	expander only	8-voice 100 presets (FM)	8			10 digital FX 8-track sequencer clock/calendar
Yamaha YS200	£449	full-size 61-key velocity	16-voice 200 prog (FM) Ram card	8	yes		10 digital effects 8-track sequencer
Casio VZ-8M	£499	expander	8-voice 128 preset 64 prog	8	yes		keyboard, guitar or wind modes
Oberheim Matrix 1000	£499	expander	6-voice 1000 preset 200 prog		yes		
Kawai K1	£595	full size 61-key touch	16-voice 96 prog Ram expansion	8	yes	percussion samples	pitch bend modulation joystick

pianos and organ. Its latest iPD (interactive phase distortion) synth is the VZ-8M expander (£499), a lower priced variant of the VZ pro-synths.

A dark horse in the expander market is Oberheim's Matrix 1000. This is (wait for it) an analogue synthesiser. Analogue sounds tend to have the same effect on ageing synth players as the legendary 4-2-4 plastic bogie has on steam train enthusiasts but with multitimbral operation and 1000 sound memories (200 of which can be edited by computer) for just £449, it is worthy of attention.

MIDI systems exclusive

A word should be said about a huge hole that was left in the MIDI standard when it was created. This is the area called systems exclusive, within which manufacturers can do exactly as they please.

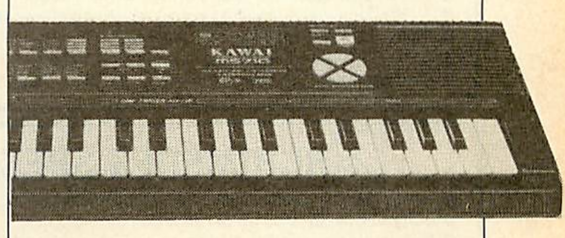
Consequently, some units do not use it all, while others have the ability to let you achieve from the safety of your own computer great things that were previously not possible.

The better owner's manuals will delve into the data formats of systems exclusive in great detail so you can set up your own programs and know exactly what you are doing and why you're doing it.

Usually the manufacturer will be keen to advertise particularly impressive facilities but there is often a concern that too much talk of data and downloads will confuse the computer illiterates.

Extra extra

Finally, before you race out and buy an expander to use with your computer,



think carefullly. Programming entire songs without a music keyboard is a time-consuming business on a par with typing in listings of entire games.

It is recommended you either pick up a cheap MIDI master keyboard or start off with a keyboard as your premier purchase.

So get your MIDI ports buzzing and join the computer music party. It's cheap and it's powerful. Who can tell the fun, frolics, fame and fortune that may lie just around the corner!

MUSIC 3000

Ian Waugh finds new voice with Hybrid's latest Expander

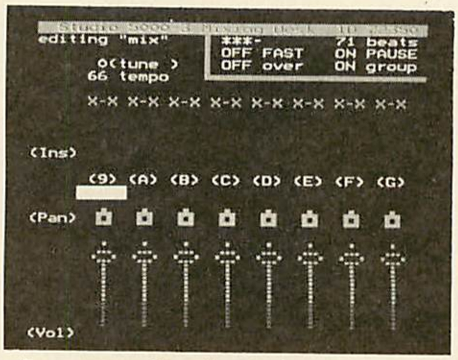
The final gap in the Hybrid Music System is now plugged with the release of the Music 3000 Expander. The System now contains hardware modules numbered 1000 to 5000.

The Hybrid Music System is a powerful self-contained synthesiser and music composition system controlled entirely from software running on a BBC micro.

In conjunction with the Music 5000, the 3000 doubles the System's number of voices to 16. This should help silence critics who say eight voices on synthesisers is just not enough.

The 5000/3000 combination provides 32 channels of sound (which are usually paired in instrument definitions) and a single one of 10 music parts can now contain up to 12 voices.

Apart from the increase in the number



of parts and voices, the only other noticeable operational change can be found in the Mixing Desk. Moving the cursor off screen to the right brings another eight channels and faders into view numbered 9, A, B and so on.

With the extra voices you may find that mix words will not fit into the Notepad although mixes are just as easily constructed (as before) in the Mixing Desk.

Another obvious use for the extra voices is the production of fuller percussion scores and you will now be able to create full six or eight voice piano parts and still have voices to spare for bass and melody lines. The extra voices will also allow you to create bigger sounds, even ones using all 16 voices!

The Music 3000 breaks Hybrid's traditional £149 plus VAT pricing policy and is by far the cheapest music expander on the market.

It will prove very tempting to Hybrid Music Systems users such as educational establishments as well as to the growing number of individual users.

Music 3000 Expander £115 from Hybrid Technology, 273 The Science Park, Cambridge, CB4 4WE. Tel: (0223) 420360.

TIME WATCH

Rob Miller gets organised with the new Arc desktop diary

One feature missing from the otherwise excellent Risc OS applications was a new version of the diary program, originally part of Arthur. Mitre Software has come up with a solution in the form of *Timewatch*, an all singing, all dancing diary for use on the desktop.

Timewatch installs itself on the icon bar and can be called up at any time (given enough memory). On selecting the icon, a kind of 'double-window' is displayed.

The current year, month and day are shown in the top area while actual data is displayed in the bottom section. The lower half is divided further into four sections – appointments, notes, tasks and birthdays/anniversaries.

Text can be typed into a section or imported in as an Edit file. A boon is the ability to load files created using the old



Arthur 1.2 Diary utility.

All date management is handled by *Timewatch*, with extra days being added if they are required. Once entered, different appointments, tasks and so on can be edited, shuffled around or deleted, depending on their importance or validity.

Tasks can be 'ticked' to signify that they've been accomplished. Unfinished tasks are constantly displayed on all pages until ticked or removed.

Once you've created a large file, the time will come when you wish to find some vital piece of information. *Timewatch* allows a file to be searched between two defined dates.

If a match is made, a report window displays each match with its date and category type. You can then move to each relevant page by just clicking on athe particular date shown.

Timewatch is certainly the best (if not the only) Risc OS diary program at the moment. It conforms perfectly to the desktop style adopted by Acorn and therefore is both simple and easy to use.

Timewatch £29.95 from Mitre Software, International House, 26 Creechurch Lane, London EC3A 5BA. Tel: 01-283 4646.

A SCROLL IN THE WORDS

Dave Futcher takes a look at the current range of wordprocessors for the BBC

At some time we all need to write. Notes, memos, lists, letters, articles, reports are all needed. Some of us even need to write books and manuals.

Many people still write with pen and paper. The typewriter is also far from dead. But since the advent of the cheap micro more and more people have taken to the wordprocessor. It is the wordprocessor that has revolutionised the preparation of text.

Over the last seven years, BBC micro users have been fortunate in the number of wordprocessors available to them.

Acornsoft's *View* and Computer Concepts' *Wordwise*, *Wordwise Plus* and *Interword* have attracted most of the attention. However, other packages have come and gone and there are more than these famous three available.

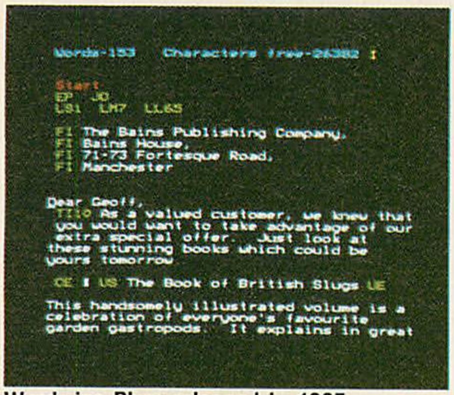
The first word

The first issue of *Acorn User* (July/August 1982) contained an advert from Computer Concepts for *Wordwise*. Whether it actually was the first BBC wordprocessor is a matter of debate. There were cassette based wordprocessors around like IJK Software's *Wordpro* and H & H Software's *Alphabeta*.

Early adverts priced the Rom based *Wordwise* at £65 but it was finally sold at just £39 in November 1982, months ahead of Acornsoft's *View*. It soon grabbed an enormous share of the BBC software market. Amazingly, Watford Electronics still sell versions of the original package for £26.

The strength of *Wordwise* back in the early days of the Beeb was that it was fast, simple and extremely easy to use. At the time it seemed impossible to imagine anyone having difficulty in entering text and printing it out with *Wordwise*.

Unlike some of the other early BBC wordprocessors, *Wordwise* has a full set of commands offering block move and copy, string search and replace, as well as a full range of formating commands for justification and text centring.



Wordwise Plus: released in 1985



Interword: does just about everything

Wordwise uses mode 7 for text entry and editing, which had considerable advantages to early Beeb owners using TVs rather than monitors.

However, although mode 7, might be easy to read, it gives no feel for the finished formatted appearance of the document. With *Wordwise*, all formatting is controlled by special cammands embedded into the text of the document but not printed. Cleverly all these commands are displayed in green when editing text.

However, *Wordwise* provides a good means of seeing the formatted text with a 'preview' mode.

Computer Concepts took notice of the comments and feedback they received about the package and the result was the 16K *Wordwise Plus*, released in early 1985. They even got the upgrade path right too, selling the new expanded product to existing users for £19.55, although the full price was £56.25.

With *Wordwise Plus* there are no longer problems from pressing BREAK and safety netting to prevent the overwriting of existing files. In addition, operations like loading and saving were ten times faster.

The new product worked with a full range of BBC add-ons like the Aries B-20 and Watford Ram board which gave the orginal BBC Model B Shadow Ram.

Among the forty new features, were 15 new embedded commands, some of which such as underline and double strike defaulted to work with Epson compatible printers. Some welcome new CTRL commands were introduced too to re-count words and remove markers.

But the most important addition to *Wordwise Plus* was the programming language. This allowed features like mail merge, two column text and index generation to be developed.

Within no time a vast set of programs appeared to support this outstanding feature of *Wordwise Plus*.

Even today Norwich Computer Services still market some packages that enable specialised applications such as TV or radio script generation to be operated. Norwich's greatest contribution was the CP-Rom which enabled *Wordwise Plus* to have a continuous processing feature without a limit on the size of documents.

Watford Electronics and Beebugsoft produced specific link packages, such as *WordEase* and *Word-Aid*.

Room for a View

View was Acorn's own wordprocessor, the original version known as 1.4 had been designed and developed by Protechnic Computers of Cambridge – the forerunner of Colton Software.

Like many BBC products it has gone through a number of stages of development. The latest, *View 3.0*, is provided free with the Master 128 and the Compact.

Over the years *View* has become well known as being difficult. This is certainly the case for the first time user.

However, despite first appearances, *View* is easy to use. It is a fast, efficient and sophisticated wordprocessor. With practise it becomes a powerful tool.

View differs from *Wordwise* in that text is formatted on the screen as it is entered, which allows you to see more clearly how the final pages of print will appear. At the top of the screen is a ruler showing the left and right margins and any tab stops. *View* allows up to 100 rulers in a document and each ruler controls the formating of the text up to the next ruler.

Another advantage of *View* is that it allows lines of up to 132 characters to be shown on the screen, with the screen scrolling horizontally when needed.

However, although *View* has gone through three major versions over the last seven years, it is not in my opinion 'definitive'. There is no safety net to stop you over-writing an existing file and no numerical information on the rulers to assist formatting. For many *View* users the use of the function keys is just too much – 29 separate commands in what seems like a random order.

But for authors, *View* has one powerful and unchallenged package to assist you – *ViewIndex*.

Early contenders

Another early BBC wordprocessor which built up a reputation for its clear on-screen formatting with visual tabs and margin setting was Braintech's *Beebpen*.

Unfortunately its failings seemed to be in the control of the package which made no use of the Beeb's function keys like *Wordwise* or *View*.

Beebpen's greatest asset was that its price undercut *Wordwise* but very few BBC owners thought that too enticing.

Back in 1985 another popular package was Merlin's *Scribe*. At £60 it was dearer than some packages but had much to commend it. The document size is not limited by the computer's memory and up to 255 page documents are possible. *Scribe* features automatic disc buffering so that text is moved between disc and computer memory automatically.

Scribe also automatically takes back up copies, compacts the disc and assesses how much disc free space is available. Unfortunately, *Scribe* is hungry for disc space and it is not easy to use for double or treble spaced text. But unlike most of the early BBC wordprocessors it does offer integrated links – with the Merlin Database – to give conditional search with mail merge and report formatting.





View Professional: intriguing

Ian Copestake Software's *Wordsworth* was an early entry into the BBC wordprocessing stakes. It was finally superseded in 1986 by *Wordpower*. Unlike any other package it runs on virtually every piece of Acorn equipment (except an Atom).

The basic package consists of a disc, a Rom, function key strip and a first class manual. It's available in any disc format and works in any screen mode. It can also use sideways Ram and shadow Ram to good effect and will run on every type of BBC based network.

The package is considered by many schools to be an outstanding product. This is because of the power of the package and the ease of use it maintains.

Even with a Rom fitted, the *Wordpower* disc must be inserted when you start up as this loads in a file containing information to set the screen mode, colours, line length, printer type and so on.

Of course, all the facilities you would expect are there but there are a number which really make it stand apart.

The screen can be split into two windows of variable size and then these used to show two separate files for editing at the same time.

A friendly mail merge facility is also available and a simple database can be built up in *Wordpower* itself, this being supplemented by special links allow *Wordpower* to mail merge with data from *ViewStore*, *System Delta*, *SupaStore* and quite a few other database packages.

Wordpower has had more updates than any other wordprocessor. A buyer gets the best support available from any company and from the author himself.

The test of time

Another popular writing tool with BBC users is the wordprocessor found in Database Publications' *Mini Office*. Once selected from the database, spreadsheet, graphics and communications options available, you are presented with a package that is familiar to *Wordwise* users.

There are a few more options available but there is a strong thread of *Wordwise* running through the whole program. Unlike *Wordwise*, *Mini Office* can display text in 20, 40, or 80 column modes, in 20 column the text appears in double height as well as double width.

Another difference is that with *Mini Office* you can select most of the major page formats from a separate menu at print time, which can be more convenient for some users, who find embedded commands difficult to use.

By and large the *Mini Office* wordprocessor is good value and will work very well for limited writing tasks. When you consider what other applications come with it, its amazing value!

Interword is rated by many people to be the most powerful wordprocessor available for the BBC micro. It can do just about everything you could ask of a Beeb wordprocessor, although there are difficulties with mixed single and double spaced text.

Because of its development background it owes much to the experience of tens of thousands of *Wordwise* and *Wordwise Plus* users.

Unlike any other BBC wordprocessor *Interword* is genuine WYSIWYG – text appears on the screen exactly as it will be printed on paper. The format of pages is controlled by rulers in very much the style of *View*. There are no green embedded commands like *Wordwise*.

For the first time on the BBC, *Interword* uses pull-down windows which make the selection of options easy to use and control. Sensibly, *Interword* also allows alternative short key selection too.

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Although *Interword* is easy to use, it does take a little time to master. The main reason for this is the poor manual.

Anyone wanting the very best in Beeb wordprocessing should turn to *Interword*, but do remember it is not an isolated program, it forms part of an integrated series called the *Inter-series* which as a whole provides great potential for all the common tasks performed on a computer. Information can be transfered quickly and easily from one to another, unlike any other program or suite of programs.

A professional view

The latest wordprocessor to arrive for the BBC is *View Professional* and this can be best described as intriguing. It is a WYSIWYG wordprocessor but it comes with additional spreadsheet defined expressions.

It is similar to *View* but it does appear slightly different. The rows are numbered and the ruler at the top is laid out with alphabetically headed columns, through both can be switched off.

All the standard *View* controls are available for editing. Characters can be inserted or deleted and there is a useful delete word command as well.

Other versions of the product (called *Pipedream*) are available for the IBM PC and the Archimedes. In addition it is built into the Cambridge Computer's Z88.

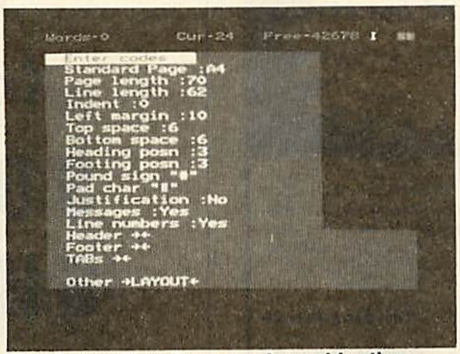
Although the BBC version does not have all the menu control, dialogue boxes and some of the enhancements of the other versions, the file structure across them all is the same. So passing files between micros has never been easier. The IBM PC and Archimedes versions of *Pipedream* even have built-in import and export facilities as does latest *View Professional ITT*. *View Professional* is an ideal choice for anyone with more than one type of micro.

If you use spreadsheets and wordprocessors, *View Professional* offers tremendous potential. It does not offer all the power that *View* does (it does not include macros) but it can do most of what *View* does and it provides several useful features missing from *View*.

View Professional is an under-rated wordprocessor for BBC users. It deserves far more consideration and a wider usage.

Even the best and the popular can be improved and there have been two recent products which have attempted to do that to *Wordwise Plus* and *View*.

In co-operation with Computer Concepts, IFEL has provided an upgrade for *Wordwise Plus* called *Wordwise Plus II*.



Wordwise Plus II: a good combination

This is a re-write of the program and not an extension. At first glance it looks just like the package that first arrived in 1985, except for an information window in the main menu screen, but on closer examination the 'golden oldie' is considerably enhanced.

Loading and saving text with *Wordwise Plus II* is considerably enhanced. If SHIFT-1 OR SHIFT-2 are pressed at the main menu, an *Interword* style menu appears for selecting a filename.

The new *Wordwise Plus II* also has a whole host of new control keys available in addition to those in the original.

The embedded commands for page layout can be inserted with a pop up menu accessed by CTRL-O. Similarly the selection of different printer styles is improved. Another pop-up menu called by CTRL-E allows the insertion of print codes like underline, double strike, and emphasized.

The marker facilities of *Wordwise Plus* are improved, so that markers can be automatically placed around single words with CTRL-Z and around paragraphs with CTRL-P. The concept is further extended by the use of CTRL-M which will place a pop-up menu on the screen that enables you to choose to move, delete, or copy a marked section of text.

Amazingly *Wordwise Plus II* has the feel of *Interword* but retains the style of *Wordwise* – a good combination.

Just as IFEL has improved *Wordwise Plus*, *Tubelink* has produced a package called *Double View* to enhance *View* and *ViewSheet*. As well as improved status information on the editing screen, there are considerable improvements to the command mode. ESCAPE now leads to the *Double View* main menu which provides 10 menu options replacing and supplementing *View*'s own commands.

Interestingly, the authors have also totally re-written the routines which write characters to the screen, with a 35% increase in speed. An additional 106 character wide screen is included which makes it far easier to work on wide documents.

The most important improvement is the option to handle two separate documents together. Once the first document is loaded, CTRL-X will toggle the alternative screen window and a second text file can then be loaded. The user can them switch between them.

The relative size of the two windows can be adjusted and the text in the window selected scrolled up and down.

Double View also provides a set of start-up options and basic facilities for linking *ViewSheet*, such as pasting part of a spreadsheet at the current cursor position in a *View* document.

Conclusion

For many, the choice of a wordprocessor depends on the kind of document required. It also depends on the kind of facilities you need or can do without. Many packages have features you never or rarely use.

View, *Wordwise Plus* and *Interword* have tens of thousands of users, attracted by the features they feel at home with an the support they can get from the publishers.

Whatever wordprocessor you choose, it will not be perfect. But all of the present BBC wordprocessor mentioned in this article do do their job superbly and other great value for money!

Wordwise Plus *£49 from Computer Concepts, Gaddesden Place, Hemel Hempstead H2 6EX. Tel: (0442) 63933.*

View 3.0 *£48 from Acorn dealers.*

Interword *£56.35 from Computer Concepts.*

Wordpower *£40 from Ian Copestake Software, 10 Frost Drive, Wirral, Merseyside L61 4XL. Tel: 051-648 6287.*

View Professional *£59 from Colton Software, Broadway House, 149-151 St Neots Road, Hardwick, Cambridge CB3 7QJ. Tel: (0954) 211472.*

Mini Office II *£59.95 from Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Tel: (0625) 878888.*

Wordwise Plus II *£49 from IFEL, 36 Uplands Drive, Plymouth, Devon PL6 6BD. Tel: (0752) 847286.*

Double View *£39.95 from Tubelink, PO Box 641, London NW9 8TF. Tel: 01-205 9393.*

Word-Aid *£24 from Watford Electronics, 250 Lower High Street, Watford WD1 2AN. Tel: (0923) 37774.*



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GOOD SHOT

Richard Browning gives a moving account of a great addition to Solidcad

The *FilmMaker* addition to *Solidcad* allows the animation of objects within a scene, and the movement of the camera through a scene. The scenes used cannot be created from within *FilmMaker* but from *Solidcad*. There are four windows exactly the same as *Solidcad* giving front and side elevations, plan and projection. The same zooming and panning operations can be carried out, as well as the same 3D projection style (solid, shaded, wireframe).

All objects, including the camera, are animated by following paths. Up to 26 paths can be specified although some have a special purpose.

Each path has a number of nodes associated with it, which define the path direction. The entry of nodes is similar to the entry of points within *Solidcad*. Use is made of two elevations to supply x, y and z co-ordinates.

If you make a mistake positioning a node, you can select and adjust it and the path will change accordingly.

Only a small number of nodes need be entered. If necessary the program can generate the 'inbetween' points if more animation frames are needed. An entire path can also be moved if required.

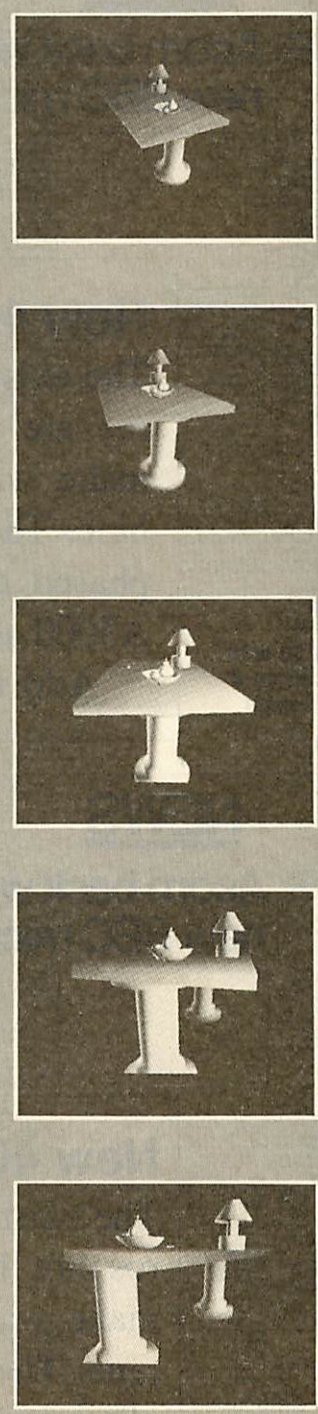
Allocating paths

To animate an object in the scene, the user REGIONS it off then assigns a path to it. Similarly, the camera can follow a path and so also can the position at which the camera is aimed (although the 'centre of interest' can remain fixed).

Paths A and B are reserved for the camera and centre of interest paths. The centre of interest can also be defined as being straight ahead of the camera which is the simplest procedure.

Care must be taken when regioning something. If the region overlaps onto part of another object, that part will also follow the path and can lead to rather interesting effects!

I did come across one problem. I designed a village full of little mud huts and regioned off one of the huts to describe a path in the air! However, the program insisted I had assigned two huts to the path, and sometimes the whole village took flight! But this was an isolated incident. Regioning is otherwise well-behaved.



FilmMaker is very easy to use and specifying the movement of objects is a dream

Animating the Scene

The number of frames that can be generated is constrained by the disc capacity (also the maximum number of files per directory). Making sure that the correct 3D style is selected and the required paths are active, the Delta option from within the Make submenu is picked to begin generating and saving the animation.

Assuming no errors occur, the next thing to do is install the animation. Clicking on the Install option makes the disc bootable straight into the animation. This does mean, though, that animation is restricted to one per disc. More can be stored but this requires clicking on the icon for the animation required which is a bit annoying.

Also, if the camera happens to dissect a facet then that facet will disappear and other strange lines will appear – something of a bug, this.

Conclusion

FilmMaker is very easy to use and specifying the movement of objects is a dream. The installation of animations on disc could do with some improvement – it's possible that the program could be changed to install a menu system on the animations disc which would display all the animations that might be available on that disc.

The manual is to the same standard as the one with *Solidcad* – the text is clear and descriptive, but the screen dumps definitely need to be improved. When the *Solidrender* ray tracing package is available, the whole *Solid* range is going to require some beating.

FilmMaker *costs £79.95 from Silicon Vision, Signal House, Lyon Road, Harrow HA1 2AG. Tel: 01-422 2274*

HOLD THE FONT PAGE

Graham Bell finds Acorn's new Desktop Publisher compares well with the competition

Revealed in *Acorn User* a year ago and demonstrated to curious crowds at computer shows for over six months, Acorn's *Desktop Publisher* has now arrived. although written by Cambridge-based GST, it carries the Acorn name and a hefty price tag. Is it worth the wait?

The package contains three discs – one for the program itself, one for a set of examples, and a 'work disc'. The work disc also contains a new version of the Risc OS font manager and a starter set of 14 fonts. There are also some upgraded printer drivers on the program disc (see box).

You can make copies of all three to use, or install the lot on your hard disc. There's also a 120-page manual, plus the usual leaflets and notes.

Most people will start using *Desktop Publisher* on a 1Mb machine. It works, but only just. To get it going, you install the new font manager from the work disc (it installs itself as soon as you call up a 'directory viewer'). There isn't enough room for the font system and the DTP program on the same disc so slip in the program disc and click on the DTP application icon to install it at the foot of the screen. Then switch back to the work disc, because you need constant access to the fonts on it.

At this stage there's perhaps 50K of memory free, depending on the exact configuration of your micro. There's no room for a wordprocessing program, indeed hardly room for a printer driver.

This means 2Mb of memory is really necessary to use this program effectively. For the mass of 310 owners, no-one has yet cracked that problem (although Mach Technology has announced a product and Watford is rumoured to be working on it).

A hard disc is a boon too, as it speeds up access to the fonts and eliminates all the tedious disc swapping.

Clicking on the DTP icon or a DTP file opens up two windows, the main one for the page you're working on and a 'control panel' window.

Creating a document is a four-fold process. First, you create a 'master page' which contains things that must appear on every page (running headers, footers and the basic column structure). This master page is the basis of the 'style sheet', which can be saved separately from the document itself.

Next, you create each page and the 'frames' on it. All text and graphics have to be put in frames and a page with three simple columns of text would have three frames.

A new frame can be placed with the mouse and by pulling out tiny ears or handles attached to the frame, you can change it's size and shape. The frame edges snap to any nearby column guides set on the master page but you can place them anywhere.

If the mouse isn't precise enough, you can type in exact dimensions, in inches and tenths, centimetres and millimetres or the picas and points used in the printing industry.

You can drag in icons of plain text files created with *Edit* or text from *First Word Plus*. Each file appears in a list of 'stories' in the control panel and the text can be put on the page by selecting a frame than clicking on the story name. If the text doesn't all fit, you can make it flow into a subsequent frame by clicking on that one.

As the text flows in, it's drawn in the main 'body text' typeface and style – for example, 10pt Trinity (Times) fully justified with the first



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. . . while this came from a professional typesetting system

line of each paragraph indented.

Importing is intelligent enough to change quote marks to correct opened and closed quotes and words are automatically hyphenated in reasonable places. There's an exception dictionary you can add to, if you don't like the program's hyphenation decisions.

Small amounts of text can be typed directly into a frame too. Although this is useful for headlines, the 'wordprocessor' isn't really good enough for more than a few words.

You can edit the text in frames, to correct errors or ensure that columns are the right length for example.

Once the text is imported, you can change its style. There are pre-set styles for headlines, sub-headings and main text. You can add new styles too by altering the font and size, leading (extra space between each line of text) and whether the text is justified and hyphenated.

Once you've set up the styles, they can be applied to each section of text by clicking on the paragraph or section of text and then on the required style. The styles you set up can be saved along with the other details of the master page in a style sheet file.

Graphics can be imported too, from sprite files from *Paint* or *Artisan* for example or from drawing files from the collection of images on the examples disc, *Draw* or Minerva's *Graph Box*.

Most parts of the program are easy to use. Of course, as a Risc OS application, you know what to expect from the menus, icons and so on. You can almost create your first page without reading the manual, although a cursory read is better.

DTP makes good use of the Wimp interface and with some knowledge and perseverance you can create very professional-looking pages. It takes a few hours to do a completely new page but the saved style sheet helps immensely the next time you do a similar job.

Other sections of *Desktop Publisher* are annoying and limiting. Setting up column guides of a particular size on the master page is difficult — it's done in terms of the margin sizes, not the widths of the columns you want. To set three columns of 14 picas each (as on this page), you need to measure the width of the paper and subtract. And you can't use any guides other than the column guides.

Other DTP packages allow you to put extra guides on the master page, or to have column guides of unequal width, but you can't do either with *Desktop Publisher*. You also can't import graphics into the master page – useful for placing logos at the top of every sheet, for example.

The frame system for text works well and is easy to get used to. It's less happy with graphics. When you import graphics, the picture is scaled to fit so you can't preserve the aspect ratio.

You can't alter the size of a graphic frame without altering the aspect ratio either – so you inevitably end up squashing circles in drawings or making text in pictures unreadable.

The most limiting problem of *Desktop Publisher* is that you can't condense text. *Draw* and *Edit* allow you to pick text width and adjust height independently, so you can set 8pt text to 10pt. *Desktop Publisher* has no such facility.

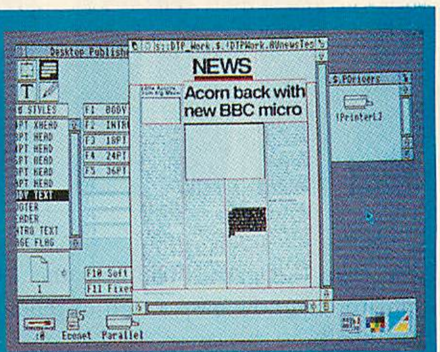
Apart from this there are other irritations – you can't make text go beyond the edge of the paper (called 'bleed' in the trade) and you can't change typeface in a header or footer on a page (so the 'BBC' in 'BBC Acorn User' at the bottom of this page couldn't be italic.

Another oddity is that changing the master page doesn't affect any pages you've already done, only new pages. There's no way to show the printing limits of the printer you're using, as there is with *Draw* for example, as an aid to placing frames. And although the graphics tools provided by the program don't aim to be comprehensive – (*Desktop Publisher* wisely leaves that to programs like *Draw*, *Paint* and *Artisan*) a more convenient way of drawing column rules is desperately needed.

Desktop Publisher is at least comparable with most mid-priced DTP packages on the Mac or IBM PC, and it is streets ahead of that of GST's *Timeworks*, the Atari ST program at its heart.

This is real desktop publishing, not the pale imitation possible with a Master 128 or model B. It is possible to produce good-looking pages, providing you are aware of the limitations of the package and don't try anything too ambitious. But with no hard disc and 1Mb of memory, the package is almost unusable to produce more than four pages and you're letting yourself in for a lot of disc swapping.

The list of omissions is long enough to ensure this isn't the last word in Arc desktop publishing. With a price tag of £150 and at least another three packages slated for release soon, 'wait and see' seems like good advice.



Making a page: once text is imported you can change its style, this is then applied to each section of text by clicking on the section of text followed by the required style



RISC OS UPGRADE

Desktop Publisher upgrades Risc OS in two areas. On the DTP disc are a set of four upgraded printer drivers, for Postscript laser and dot-matrix printers as before plus new drivers for the cheaper Hewlett Packard Laserjet compatible laser printers and the ever-popular Integrex colour inkjet printer.

All reproduce on paper all the fonts and graphics effects available on screen and although Hewlett Packard laser printers are some £2000 cheaper than Postscript models, the final output is indistinguishable from the real thing.

It just takes time, some five minutes per page.

The second area of improvement is the font system. A new software module replaces the existing font software in the Risc OS Roms, and there are 14 new fonts to replace the three that come with the Risc OS welcome discs.

The new fonts are outline fonts: their quality on screen doesn't depend on their size. The font system is much more advanced than anything Apple or even Sun have and Acorn deserve recognition for this. All that's needed now is a good range of fonts.

GAMES

The return of the *BBC Acorn User* show was an enormous success last month but there were really only two mainstream Acorn game merchants on hand with new releases.

Rising stars Mark and Steve Botterill occupied the Impact stand opposite the *BAU* enclave and from what I saw and heard they made many sales of their new products. In particular the *Holed Out* extra courses especially interested new Arc A3000 owners.

Superior had a much less prestigious stand – a couple of Beebs on a table and a mountain of software decorating the back wall. Still, at least they showed, which is more than can be said for Tynesoft, Audiogenic and the like. *Ballistix* was Superior's main attraction and there were always one or two people giving it a try.

Topologika also had a stand and after some confusion we managed to clear up the state of play for its release in the not-so-distant future.

In the June issue I made a comment about Arc adventure games revamped from the early Beeb days. There has been a bit of a mix-up at Topologika HQ and those of you who were disappointed to hear that the games required the PC emulator can now gasp a sigh of relief – they don't.

If you're a nostalgic adventurer who has recently been converted to 32-bit, you might like to get one or all of the three disk currently on offer for just under £20.

The first contains *Countdown to Doom*, *Return to Doom*, and *Philosopher's Quest*, the second *Acheton* and *Kingdom of Hamil*, and the last *Avon* and *Murdac*. A stand alone game *Yes Chancellor* is reliant on an emulator and places you in the role of the Chancellor of the Exchequer – *Yes Minister* style. Let's hope you can do better than Nigel Lawson.

Domark has sent word of a computer conversion of the board game *Pictionary*, the graphically orientated charades game.

The game is the first to incorporate a basic art package – the idea is to draw clues for other players to guess a word. If everyone's a useless painter, the computer can take over the role of picturist. The launch date is scheduled for the *PC* show in September.

GEM Electronics, the producers of *Word Up Word Down* and *Startrader* are set to release a 'graphic role playing adventure war game'. *Arcane Lore* is a Risc OS compatible game along the lines of many of Ultimate's works. Set in a land of sorcery and corruption, the makers claim it will appeal to everyone due to its careful balance of combat and strategy.

It seems the most eagerly awaited Archimedes game at present is *Karma* from Periscope software.

The bad news is the release date has been postponed till Christmas but the good news is that this is because the programmers want to make some further enhancements to *Karma*.

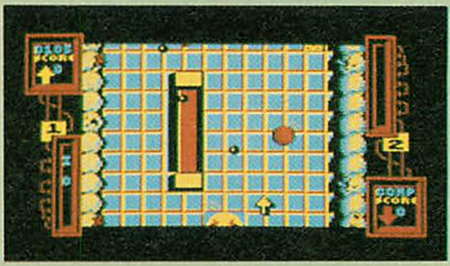
If all goes well, pilots will then be able to dock with other craft as well as stations, and there will be the effect of true gravity and genuine physical orbits on all artificial satellites.

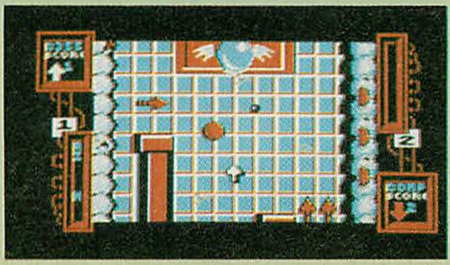
Don't worry if you don't understand all that, it just means the game is going to be good! I'll keep you posted with all new developments.

Sam Greenhill

Anyone holding back tips, high scores, cheats or news is doing the games world a grave injustice. Please send them to The Games Pages, BBC Acorn User, *20-26 Brunswick Place, London N1 6DJ.*

Ballistix: Superior Software BBC Cass £9.95, Disc £11.95, Compact £14.95, Electron Cass £9.95





I was a bit sceptical about this game when I first heard of it. The 16-bit versions are pretty complicated and let's face it, the Beeb isn't 16-bit.

Ballistix is a futuristic ball game. The stadium covers three vertically stacked screens and the two players, depicted by a couple of arrows, must fight to aim the 'game ball' at one of the two goals by bombarding it with smaller balls fired from the player's gun.

Three goals are needed to succeed a level and a password system allows players to skip a level once they've completed it.

In one-player mode the computer is a wary opponent and will usually refrain from firing first. In other words its play is useless. However, the screens are heavily biased in its favour.

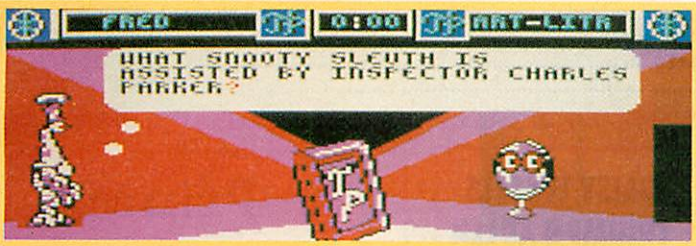
The stadium is littered with gizmos. The most common are red arrows which speed up the ball but magnets, suction tunnels, oil slicks and even black holes can be found.

Sometimes letters will appear on the tiled-floor and if you shoot the right ones the word 'RICOCHET' can be built up for a bonus. But it's only really fun with someone else. The computer player doesn't even realise they exist!

The ball doesn't exactly obey the laws of physics but the action is both fast and smooth and the graphics are certainly adequate – colourful at least.

There are thirty screens for each player-mode which become progressively harder. The one-player mode is easy in some places and harder in others, and can become very frustrating sometimes.

Despite one or two annoying bugs, I enjoyed playing *Ballistix*, and that's the main thing. **Sam Greenhill**





Trivial Pursuit – A New Beginning: Domark, BBC model B, Master £14.99 (tape) £19.99 (disc)

Several board games have been converted to the trusty Beeb, one of these being the original *Trivial Pursuits*. But, *A New Beginning* could never have been a board game. It is much more computer orientated than its predecessors.

The story behind the game? In the year 2045 we have over-polluted the Earth and a lucky few are able to get away to the planet Genus II but to settle there, they have to have a superior knowledge of 'Genus Trivia". That's where we come in – flying around and landing on planets to be asked questions.

If you've played the original game, the answering system will be familiar – when a question appears on the screen, you speak the answer to the other players before it's displayed. It's up to them to decide if you got it right.

It's an excellent system for cheats and should lend itself to a lot of heated debating around the micro!

You have to collect the equivalent of six 'wedges', one from each category before you can face the Elders of Genus II to be asked the final question, which decides whether you have won or not.

There is a great difference in where and how you land in this game and in the original versions.

In *A New Beginning*, you fly around and select a planet at random, without knowing what category of question it is or whether there is a 'wedge' there. The instructions say you can obtain clues to question type from the name of the planet but I can't find any.

The graphics are not bad given the limits of the computer but the sound – especially the random noise 'alien voice' became irritating after a while.

If you like this sort of thing, it is a worthwhile buy but I think that trying to squeeze six people around a Beeb to play an upgraded board game is a little bit pointless.

Paul Thornton



Buffalo Bill's Wild West Show: Tynesoft, BBC B, Master, Compact, Electron. £14.95 (tape) £9.95 (disc)

Just as Buffalo Bill's real shows were a hapless nostalgia exercise, so this game is a throwback to the sporting games of a couple of years back.

There are six 'events' – trick shooting, knife throwing, calf roping, bronco riding, steer wrestling and the inevitable stage coach rescue.

Each event is loaded separately (which makes the tape version a tedious game indeed) and introduced with a rather nice olde western picture.

The trick shooting and knife throwing are standard enough games. For shooting, you get both goody and baddy targets and a local cowhand lobbing bottles (you can't shoot the cowhand!). For the knife throwing there's a squaw on a rotating wheel (you can squewer the squaw!).

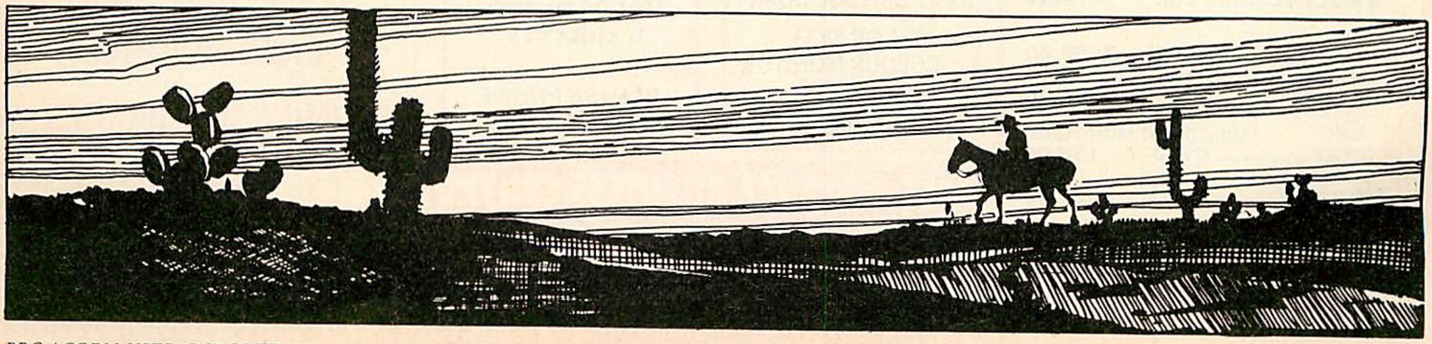
The Calf roping and Steer wrestling both involve chasing potential burgers across the arena on horseback, then leaping aboard or lassoing them and grapling the resulting tangle. The problem here is timing the leap or the lasso. I just fell off my horse.

Bronco riding must be the most difficult sport of all to simulate on a micro. Tynesoft accompany an animated bucking bronco with four meter scales which you have to counteract with the keyboard. It makes a game but has little relevance to bronco riding.

The stage coach rescue is the finale. You leap aboard (easy this time) and proceed to fist-fight the lone Indian on top of the coach.

Overall, the graphics are good and the sounds entertaining. The whole game certainly provides something for everyone, but not that much for anyone.

Sharyn Bains



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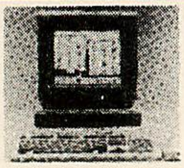
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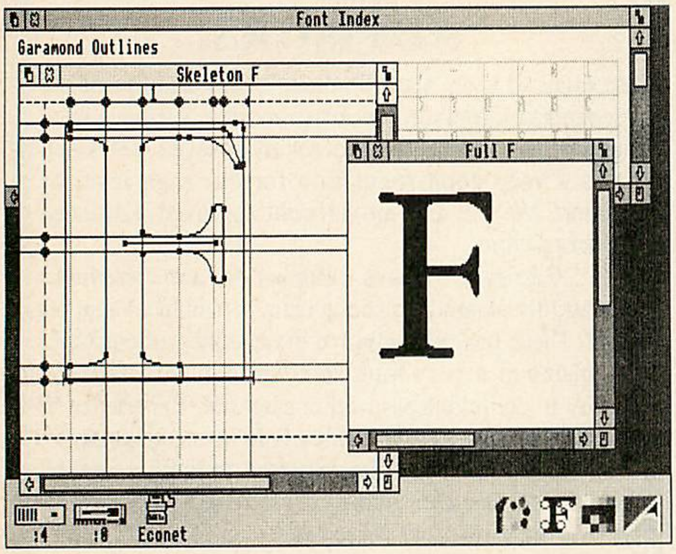
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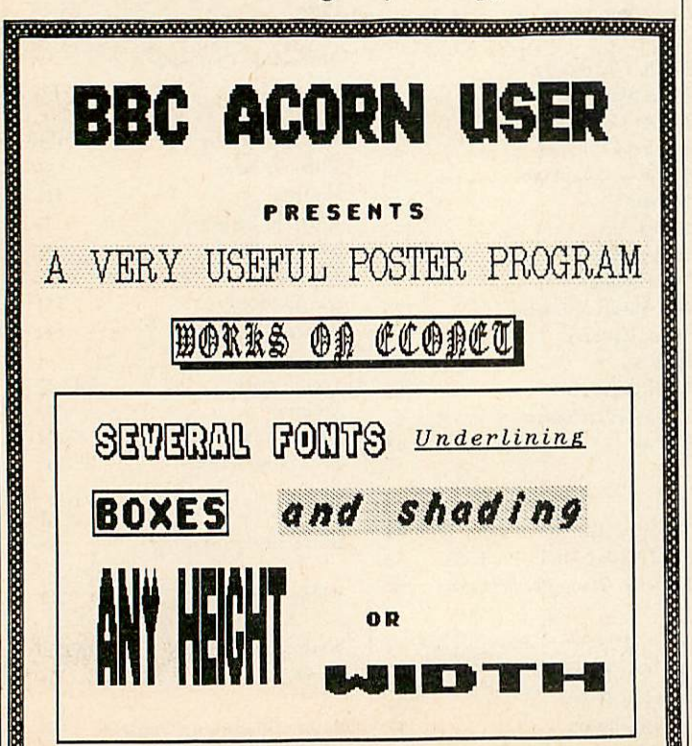


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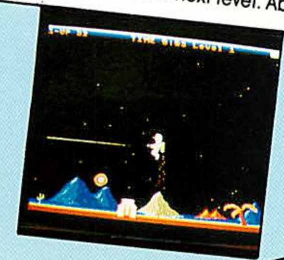


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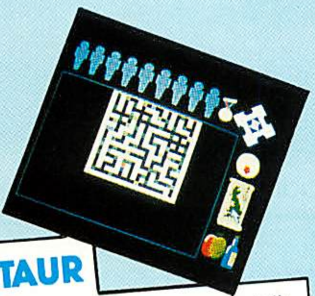
Missile Control is a classic arcade game written for the Archimedes to make full use of the advanced graphics and sound, while remaining faithful to the original concepts of the game. The Player is in control of the missile launches and must do the utmost to protect the cities from the incoming missiles. On each subsequent attack further planes, satellites or 'smart' missiles attack the target cities.





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